777c
~~531.d.~~35
2

AN
INTRODUCTION
TO
ARITHMETIC;

CONTAINING

Arithmetical Tables; with the moſt uſeful Rules in common Arithmetic.

Vulgar and decimal Fractions.---Extraction of the Square and of the Cube Root.

Rules for working on the Carpenters ſliding Rule, and on Gunters Scale.---Duodecimals, or croſs Multiplication.---Practical Queſtions in Menſuration.

The Gregorian Calendar; with a perpetual Almanac.---A Table for finding on what Day of the Week, any Month begins; alſo a Table for Planting.

A few Forms of Bills and promiſſory Notes; with a ſmall Collection of miſcellaneous Queſtions.

K

BY JAMES GRAY,

AUTHOR OF THE CONCISE SPELLING BOOK, FOR THE USE OF CHILDREN.

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ENTERED IN STATIONERS HALL.

THE principal deſign of this publication, is to initiate Youth in the fundamental rules of Arithmetic; and to be of eaſy purchaſe to the Scholar; ſo that it may be the more generally introduced into Schools. Thoſe, who may have occaſion to ſtudy this moſt uſeful Science more fully, can be amply inſtructed by many excellent and learned Treatiſes upon the ſubject.

SIGNS.

= Equal to.
+ Plus, the ſign of Addition.
— Minus, the ſign of Subtraction.
× The ſign of Multiplication.
)····(The ſign of Diviſion.
: :: : The ſign of Proportion.

ARITHMETICAL TABLES.

NUMERATION TABLE.

C. M. Billions.	X. M. Billions.	M. Billions.	C. Billions.	X. Billions.	Billions.	C. M. Millions.	X. M. Millions.	M. Millions.	C. Millions.	X. Millions.	Millions.	C. Thouſands.	X. Thouſands.	Thouſands.	Hundreds.	Tens.	Units.
·4	1	9,	8	7	6.	5	4	8,	9	8	7,	6	5	4,	3	2	1

STERLING MONEY.

Marked.		
qrs. or f.	4 Farthings	= 1 Penny,
d.	12 Pence	= 1 Shilling,
s.	20 Shillings	= 1 Pound. L.

¼d = 1 farthing, ½ = 2 farthings, ¾ = 3 farthings, 5 s. = 1 crown, 21 s. = 1 guinea, 6 s. 8 d. = 1 noble, 13 s. 4 d. = 1 mark Sterling.

SCOTS MONEY.

3 Placks = 1 Penny Sterling, 13⅓ pence = 1 mark Scots, 18 marks Scots = 1 Pound Sterling.

12 pennies Scots = 1 ſhilling, 20 ſhillings = 1 pound, 12 pounds Scots = 1 Pound Sterling.

TROY WEIGHT.

Marked.		
gr.	24 Grains	= 1 Penny-weight,
dwt.	20 Penny-weights	= 1 Ounce,
oz.	12 Ounces	= 1 Pound. lb.

By this weight are weighed, gold, ſilver, jewels, and liquors.

APOTHECARIES WEIGHT.

Marked.			
gr.	20 Grains	= 1 Scruple,	℈
ſcr.	3 Scruples	= 1 Dram,	ʒ
dr.	8 Drams	= 1 Ounce,	℥
oz.	12 Ounces	= 1 Pound.	℔

Apothecaries compound their Medicines by this Weight, but buy and ſell by Avoirdupois.

AVOIRDUPOIS WEIGHT.

Marked.			
dr.	16 Drams	= 1 Ounce,	
oz.	16 Ounces	= 1 Pound,	
lb.	28 Pounds	= 1 Quarter,	
qr.	4 Quarters	= 1 Cwt. or 112lb.	
cwt.	20 Hundreds	= 1 Ton.	T.

Almoſt all grocery and chandlers wares are weighed by this weight.

SCOTS TROY, OR DUTCH WEIGHT.

16 Drops = 1 Ounce,
16 Ounces = 1 Pound,
16 Pounds = 1 Stone,

Tron Weight is the ſame as the above, only the pound varies in different places, and for different purpoſes, from 20 to 28 ounces, and is divided into 16 of its own ounces. A peck loaf weighs 17 lb. 6 oz. Avoirdupois.

WOOL WEIGHT.

7 pounds = 1 clove, 2 cloves = 1 ſtone, 2 ſtones = 1 tod, 6½ tods = 1 wey, 2 weys = 1 ſack, 12 ſacks = 1 laſt.

CLOTH MEASURE.

Marked.			
in.	2¼ Inches	= 1 Nail,	
nl.	4 Nails	= 1 Quarter,	
qr.	4 Quarters	= 1 Yard.	yd.

5 quarters = 1 Engliſh ell, 3 quarters = 1 Flemiſh ell, 6 quarters = 1 French ell, 4 quarters 1⅕ inch = 1 Scots ell.

LONG MEASURE.

Marked.			
b. c.	3	Barley-corns	= 1 Inch,
in.	12	Inches	= 1 Foot,
f.	3	Feet	= 1 Yard,
yd.	5½	Yards	= 1 Pole, or Perch,
po.	40	Poles	= 1 Furlong,
fur.	8	Furlongs, or 1760 yds.	= 1 Mile,
m.	60	Miles	= 1 Degree. Deg.

3 Miles = 1 League, 4 Inches = 1 Hand, 6 Feet = 1 Fathom.

This Meaſure treats of Length only.

ENGLISH SQUARE MEASURE.

Marked.			
in.	144	Square inches	= 1 Square foot,
f.	9	Square feet	= 1 Square yard,
yd.	30¼	Square yards	= 1 Square pole,
po.	40	Square poles	= 1 Rood,
ro.	4	Roods	= 1 Acre. Ac.

272¼ ſquare feet = 1 Rod Brick work, 100 ſquare Feet = 1 ſquare of flooring, *&c.* 36 ſquare yards = 1 Rood of Maſon work.

By this Meaſure, every thing that has length and breadth, is meaſured.

SOLID MEASURE.

1728 Solid Inches = 1 Solid foot,
27 Solid feet = 1 Solid yard.

This meaſure comprehends length, breadth, and thickneſs, or depth.

A 3

SCOTS LAND MEASURE.

$9\frac{73}{144}$ Square Feet = 1 Ell,
36 Square ells = 1 Fall,
40 Falls = 1 Rood,
4 Roods = 1 Acre.

The Scots ell is equal to 37⅕ Engliſh inches, and is divided into 37 of its own inches.

ENGLISH DRY MEASURE.

Marked.		
	33⅗ Solid inches = 1 Pint,	
pt.	8 Pints = 1 Gallon,	
gal.	2 Gallons = 1 Peck,	
pk.	4 Pecks = 1 Buſhel,	
buſh.	8 Buſhels = 1 Quarter,	
qr.	4 Quarters = 1 Chaldron.	Chal.

The Wincheſter Buſhel contains 2150⅖ ſolid inches.

By this Meaſure, corn, ſeeds, roots, ſalt, ſea-coal, oyſters, fruit, *&c.* are meaſured.

SCOTS DRY MEASURE.

Marked.		
lip.	4 Lippies = 1 Peck,	
pk.	4 Pecks = 1 Firlot,	
fir.	4 Firlots = 1 Boll,	
bo.	16 Bolls = 1 Chalder.	Chal.

The Linlithgow wheat firlot, contains 21¼ Scots pints; it is alſo uſed for rye, peaſe, beans, ſalt and graſs ſeeds. The barley firlot contains 31 Scots pints; and is alſo uſed for oats, fruit, and potatoes.

A TABLE, reducing English Bushels and Quarters to the Edinburgh Standards, or Linlithgow Measure.

English Measure.	Linlithgow Measure.							
	Wheat & Pease.				Barley & Oats.			
	Bolls.	F.	P.	$\frac{1}{100}$	Bolls.	F.	P.	$\frac{1}{100}$
Bushels, 1	0	0	3	92	0	0	2	69
2	0	1	3	85	0	1	1	38
3	0	2	3	78	0	2	0	7
4	0	3	3	70	0	2	2	76
5	1	0	3	63	0	3	1	46
6	1	1	3	56	1	0	0	15
7	1	2	3	49	1	0	2	84
Quarters, 1	1	3	3	41	1	1	1	53
2	3	3	2	83	2	2	3	7
3	5	3	2	25	4	0	0	61
4	7	3	1	67	5	1	2	14
5	9	3	1	9	6	2	3	68
6	11	3	0	51	8	0	1	22
7	13	2	3	93	9	1	2	76
8	15	2	3	35	10	3	0	29
9	17	2	2	77	12	0	1	83
10	19	2	2	19	13	1	3	37
20	39	1	0	38	26	3	2	74
30	58	3	2	57	40	1	2	11
40	78	2	0	76	53	3	1	49
50	98	0	2	95	67	1	0	86
60	117	3	1	14	80	3	0	23
70	137	1	3	33	94	0	3	60
80	157	0	1	52	107	2	2	98
90	176	2	3	71	121	0	2	35
100	196	1	1	90	134	2	1	72

WINE MEASURE.

Marked.			
	$28\frac{7}{8}$ Solid inches	= 1 Pint,	
pt.	2 Pints	= 1 Quart,	
qt.	4 Quarts	= 1 Gallon,	
gal.	63 Gallons	= 1 Hogſhead,	
hhd.	2 Hogſheads	= 1 Pipe,	
p.	2 Pipes	= 1 Tun.	T.

10 Gallons = 1 Anker, 18 Gallons = 1 Rundlet, $31\frac{1}{2}$ Gallons = 1 Barrel, 42 Gallons = 1 Tierce, 84 Gallons = 1 Puncheon. The gallon contains 231 ſolid inches.

By this meaſure, ſpirits, perry, cyder, vinegar, oil and honey, are meaſured.

ALE AND BEER MEASURE.

Marked.			
	$35\frac{1}{4}$ Cubic inches	= 1 Pint,	
pt.	2 Pints	= 1 Quart,	
qt.	4 Quarts	= 1 Gallon,	
gal.	8 Gallons	= 1 Firkin of Ale,	
	9 Gallons	= 1 Firkin of Beer,	
firk.	2 Firkins	= 1 Kilderkin,	
kil.	2 Kilderkins	= 1 Barrel,	
bar.	$1\frac{1}{2}$ Barrel	= 1 Hogſhead.	hhd.

The ale gallon contains 282 ſolid inches. $8\frac{1}{2}$ gallons is a firkin of ale, ſtrong beer and ſmall, in all parts of England, except London.

Marked. SCOTS LIQUID MEASURE.

6.44375 Cubic inches = 1 Gill,
g. 4 Gills = 1 Mutchkin,
mu. 2 Mutchkins = 1 Chopin,
ch. 2 Chopins = 1 Pint,
pt. 2 Pints = 1 Quart,
qt. 4 Quarts = 1 Gallon,
gal. 16 Gallons = 1 Hogſhead. hhd.

103.1 ſolid inches a Scots pint. Three Scots pounds of the water of Leith, is the ſtandard of the above pint.

YARN.

120 Threads = 1 Cut,
2 Cuts = 1 Heer,
6 Heers = 1 Slip,
4 Slips = 1 Spindle.

Marked. TIME.

ſec. 60 Seconds = 1 Minute,
min. 60 Minutes = 1 Hour,
ho. 24 Hours = 1 Day,
da. 365 Days 6 Hours = 1 Julian year. y.

365 days, 5 hours, 48 minutes, 57 ſeconds = 1 ſolar year.—30 days = 1 month, 12 months = 1 year; 7 days = 1 week, 4 weeks = 1 month, 52 weeks, 1 day = 1 year.

30 days hath September,
April, June and November;
All the reſt have 31,
February 28 alone; but in leap years 29.

MULTIPLICATION TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

ARITHMETIC

Is the Art of computation.

The fundamental Rules of Arithmetic are Numeration, Addition, Subtraction, Multiplication, and Diviſion.

NUMERATION

Is the art of reading, and writing any number.

TABLE.

9	Units.
98	Tens.
987	Hundreds.
9876	Thouſands.
98765	X. Thouſands.
987654	C. Thouſands.
9876543	Millions.
98765432	X. Millions.
,987.654,321	C. Millions.

CHARACTERS OR FIGURES.

1, one; 2, two; 3, three; 4, four; 5, five; 6, ſix; 7, ſeven; 8, eight; 9, nine; 0, cipher.

ROMAN NUMERAL LETTERS.

I, one; V, five; X, ten; L, fifty; C, one hundred; D, five hundred; M, one thouſand.

To read any number expreſſed in figures.

RULE.

Divide the number into periods, and half periods, if neceſſary, from right to left; then begin at the left hand, and read towards the right.

EXAMPLES.

1. Read 3068.
2. Read 976705.
3. Read 8067900.
4. Write in words 14065708.
5. Write in words 980679120.

To write any number in figures.

RULE.

Write every figure in its proper place, and ſupply vacant places with ciphers.

EXAMPLES.

1. Write in figures, one thouſand and eighty. Anſ.

2. Write down in figures, ſixty four thouſand and nine.

3. Write in figures, ſeven millions, two thouſand and one.

4. Write in figures, one hundred million, ſixty thouſand, eight hundred and eleven.

1. Write in letters, five hundred and twenty nine.

2. Write in letters, one thouſand, nine hundred and eighty eight.

ADDITION

Is the collecting of two or more numbers into one ſum.

SIMPLE ADDITION.

RULE.

1. Place units under units, tens under tens, *&c.* and draw a line under them.

2. Add the figures in the unit's column, and find how many times ten, that ſum contains.

3. Set down the remainder, (if any) at the foot of the column, and for every 10 in that ſum, carry 1 to the next column; proceed thus with every remaining column, and under the laſt, write down the full ſum.

PROOF.

Draw a line under the uppermoſt number, add all the reſt together, then add this laſt found number, and the uppermoſt; that ſum will be the ſame as the firſt.

EXAMPLES.

(1.)	(2.)	(3.)	(4.)
12	234	9876	6408
34	567	5432	3467
56	891	1987	5986
78	234	6543	7642
91	567	2198	8569
23	892	7654	2398
45	345	3210	8675
67	678	6786	21904
89	906	4693	686
*			

5. Add 6845, 2867, 8490, 684, 1267, 4681, 20680 and 8045 together. Anſwer 53559.

6. Add 5408, 1467, 4500, 89, 423, 60456, 8401 and 96 together. Anſ. 80840.

7. What is the ſum of 54936, 789, 45, 3100, 7093, 84506, 379 and 480? Anſ. 151328.

8. A man born in the year 1749, when will he be 60 years of age? Anſ. 1809.

9. A lent B 30l. C 48l. D 120l. E 209l. F 44l. and G 340l. how much did he lend in all? Anſ. 791l.

SUBTRACTION

Is the method of taking a leſs number from a greater, in order to find their difference.

SIMPLE SUBTRACTION.

RULE.

1. Place the leſs number under the greater; units under units, tens under tens, &c. and draw a line under them.

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* Anſ. (1.) 495. (2.) 5314. (3.) 48379. (4.) 65735.

2. Then begin at the right hand, and take each figure of the leſs number from the figure above it, and place the remainder directly under.

3. When the lower figure is equal to the upper, write down a cipher; if greater than that above it, ſuppoſe 10 added to the upper figure; then ſubtract the lower figure from the ſum: but, you muſt add 1 to the next lower figure, before you ſubtract it.

PROOF.

Add the two undermoſt numbers together, their ſum will be equal to the uppermoſt, when the work is right.

EXAMPLES.

	(1.)	(2.)
From	846789	6805389
Take	242316	950178
Difference	*	
Proof		

	(3.)	(4.)
From	4000000	5400001
Take	2300681	60084
Remain		
Proof		

5. From 6894 Take 4086. Anſ. 2808.

6. From 1000 Take 850. Anſ. 150.

7. What is the difference between 1480 and 996? Anſ. 484.

---

* Anſwer (1.) 604473. — (2.) 5855211. — (3.) 1699319.---(4.) 5339917.

8. How much does 5809 exceed 4080? Anſ. 1729.

9. A man born in the year 1722, What is his age this preſent year? Anſ.

10. A perſon, whoſe preſent age is 73, was 27 years old at the birth of his eldeſt daughter, what is his daughter's age? Anſ. 46 years.

MULTIPLICATION

Is a compendious method of adding any number.

The number to be multiplied is called the *Multiplicand*; the number whereby you multiply is called the *Multiplier*; and the amount is called the *Product*.

Note. The Multiplicand and Multiplier are called factors.

SIMPLE MULTIPLICATION.

RULE.

1. Place the multiplier under the multiplicand, units under units, &c. and draw a line under them.

2. Multiply the multiplicand, firſt by the units of the multiplier, then by the other figures in their order, placing the firſt figure of each product directly under the figure by which you multiply, and carry by ten as in addition; add theſe products.

Note. If there be ciphers at the right of one or both factors, multiply by the ſignificant figures, and annex the ciphers to the product.

PROOF.

Make the former multiplicand the multiplier, and the multiplier the multiplicand; if this product is equal to the former, the operation is right. It may alſo be proved by diviſion.—Or thus;

1. Caſt the nines out of the two factors, and ſet down the remainders.

2. Multiply the two remainders together, and if the exceſs of nines in their product is equal to the exceſs of nines in the total product, the work is right.

EXAMPLES.

	(1.)	(2.)
Multiplicand	68945734	48096784
Multiplier	2	3
Product	*	

3. Multiply 48679048 by 6. Anſ. 292074288.
4. Multiply 80670912 by 9. Anſ. 726038208.
5. Multiply 98765432 by 12. Anſ. 1185185184.
6. Multiply 4606870 by 18. Anſ. 82923660.
7. Multiply 2345678 by 47. Anſ. 110246866.
8. Multiply 8970681 by 96. Anſ. 861185376.
9. Multiply 459068 by 185. Anſ. 84927580.
10. Multiply 809601 by 2400. Anſ. 1943042400.
11. Multiply 601570 by 3068. Anſ. 1845616760.
12. Multiply 406894 by 85237. Anſ. 34682423878.
13. Multiply 238906 by 216894. Anſ. 51817277964.

RULE.

When the multiplier is the product of two or more numbers, neither of which exceeds 12, multiply continually by theſe numbers.

EXAMPLES.

1. Multiply 68094568 by 20. Anſ. 1361891360.
2. Multiply 409673 by 36. Anſ. 14748228.
3. Multiply 8976543 by 108. Anſ. 969466644.

1. A gentleman has 40l. a week, how much is that in 52 weeks? Anſ. 2080l.

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* Anſ. (1.) 137891468.—(2.) 144290352.

DIVISION

Is a compendious method of ſubtracting any number.

The number to be divided is called the *Dividend.* The number you divide by is called the *Diviſor.* The number of times the dividend contains the diviſor, is called the *Quotient.*

SIMPLE DIVISION.

RULE.

1. Draw a line on the right and left of the Dividend; write the Diviſor on the left hand, and the Quotient as it ariſes on the right.

2. From the left hand of the Dividend, point off as many figures as will contain the Diviſor once or oftener; find how many times theſe figures contain the Diviſor, and place the figure which repreſents the number of times in the Quotient.

3. Multiply the Diviſor by the Quotient figure, and place the product under the figure or figures pointed off.

4. Draw a line, and ſubtract the product from the figures under which it ſtands.

5. To the right hand of the remainder, bring down the next figure of the Dividend, and point it off; which number divide as before, and proceed in the ſame manner, till all the Dividend be brought down.

THE RULE IN VERSE.

'First aſk how oft? in Quot the anſwer make;'
'Then multiply, ſubtract, and down a figure take.'

PROOF.

Multiply the quotient and diviſor together, adding the remainder, (if any) this product will be equal to the dividend.——Or, divide the dividend (after ſubtracting the remainder, if any) by the quotient, the reſult will be equal to the diviſor.

EXAMPLES.

1. Divide 84667 by 2. Anſ. $42333\frac{1}{2}$.
2. Divide 489764 by 3. Anſ. $163254\frac{2}{3}$.
3. Divide 386457 by 4. Anſ. $96614\frac{1}{4}$.
4. Divide 490680 by 5. Anſ. 98136.
5. Divide 867059 by 6. Anſ. $144509\frac{5}{6}$.
6. Divide 411678 by 8. Anſ. $51459\frac{6}{8}$.
7. Divide 4912037 by 9. Anſ. $545781\frac{8}{9}$.
8. Divide 8695340 by 14. Anſ. $621095\frac{10}{14}$.
9. Divide 1234567 by 20. Anſ. $61728\frac{7}{20}$.
10. Divide 7865432 by 38. Anſ. $206985\frac{2}{38}$.
11. Divide 9876540 by 87. Anſ. $113523\frac{39}{87}$.
12. Divide 14680598 by 108. Anſ. $135931\frac{50}{108}$.
13. Divide 81407910 by 384. Anſ. $211999\frac{294}{384}$.
14. Divide 40608370 by 1809. Anſ. $22447\frac{1747}{1809}$.
15. Divide 51406745 by 314689. Anſ. $163\frac{112438}{314689}$.

RULE.

When the diviſor is the product of two or more numbers, not any of them exceeding 12, divide continually by theſe numbers.

NOTE.

To find the true remainder, multiply the laſt remainder, into all the preceding diviſors (the laſt excepted) adding the ſeveral remainders to the products, to which they belong.

EXAMPLES.

1. Divide 459312 by 48. Anſ. 9569.
2. Divide 679195 by 84. Anſ. 808$\frac{55}{84}$.
3. Divide 549657 by 168. Anſ. 3271$\frac{129}{168}$.

RULE.

When there are ciphers annexed to the diviſor, cut them off, and cut off as many figures from the dividend; annex theſe figures to the remainder.

EXAMPLES.

1. Divide 45973 by 240. Anſ. 191$\frac{133}{240}$.
2. Divide 39768 by 7000. Anſ. 5$\frac{4768}{7000}$.

1. The area of a room 16 feet broad is 512 feet, what is its length? Anſ. 32 feet.

REDUCTION

Teacheth to change numbers from one name to another, without altering their value.

To bring a greater name into a leſs.

RULE.

Multiply the given number, by as many of the leſs name, as make one of the greater; adding to the product, the parts of the ſecond name, if any; proceed in the ſame manner, till you have brought it as low as is required.

To bring a leſs name into a greater.

RULE.

Divide by as many of the leſs name as make one of the greater; and thus proceed till you have brought it into that name required; the laſt quotient, together with the ſeveral remainders, if any, will be the anſwer.

Mixed Reduction, is when both multiplication and diviſion are uſed.

RULE.

Reduce the given numbers into one name; then divide the one by the other.

PROOF.

Reverſe the queſtion.

STERLING MONEY.

Examples.

1. Reduce 12s. 8d. into farthings. Anſ. 608.

2. In 1 pound how many ſhillings, pence and farthings? Anſ. 20s. 240d. 960f.

3. In 7340 farthings, how many pounds? Anſ. 7l. 12s. 11d.

4. In 40l. 10s. how many pence and half-pence? Anſ. 9720d. 19440 half-pence.

5. In 12s. $2\frac{1}{2}$d. how many half-pence? Anſ. 293.

6. In 900 guineas, how many ſixpences, and pence? Anſ. 37800 ſixpences, 226800d.

7. Reduce 309l. 15s. $10\frac{3}{4}$d. into farthings. Anſ. 297403.

8. In 900 farthings, how many ſhillings? Anſ. 18s. 9d.

9. In 4080 farthings, how many pounds? Anſ. 4l. 5s.

10. In 4000 half-pence, how many pounds? Anſ. 8l. 6s. 8d.

11. In 42336 farthings, how many guineas? Anſ. 42.

12. In 1800 pence, how many crowns? Anſ. 30.

13. In 10864 farthings, how many crowns, half-crowns, ſixpences and pence, and of each an equal number? Anſ. 28 of each.

14. In 40 guineas, how many pounds? Anſ. 42l.

15. How many ſhillings, half-crowns, and crowns, are in 278l. and of each an equal number? Anſ. 654 of each and 1s. over.

16. In 842 crowns, how many guineas? Anſ. 200gs. 10s.

TROY WEIGHT.

17. In 6lb. 10 oz. 5 gr. how many grains? Anſ. 39365.

18. In 213212 grains, how many pounds? Anſ. 37lb. 3 dwt. 20 gr.

19. In 9120 grs. of ſilver, how many tea ſpoons each half an ounce? Anſ. 38.

20. In 9 ingots of ſilver, each 2 lb. 10 oz. 10 dwt. how many grains? Anſ. 149040 gr.

AVOIRDUPOIS WEIGHT.

21. In 6 cwt. 1 qr. 18lb. how many drams? Anſ. 183808.

22. In 30 tons, 18 cwt. 2 qrs. 20 lb. 12 oz. 15 dr. how many drams? Anſ. 17738959 drs.

23. In 13440 lb. how many tons? Anſ. 6 tons.

24. In 540 parcels of ſugar, each 18lb. how many cwt? Anſ. 86 cwt. 3 qrs. 4 lb.

APOTHECARIES WEIGHT.

25. In 2lb. how many oz. dr. ſcr. and gr? Anſ. 24 oz. 192 dr. 576 ſcr. 11520 gr.

26. In 546 lb. 18 grs. how many grains? Anſ. 3144978 grs.

27. In 56789 ſcruples, how many lb? Anſ. 197lb. 2 oz. 1 dr. 2 ſcr.

CLOTH MEASURE.

28. In 400 yds, how many nails? Anſ. 6400 nls.

29. In 500 nails, how many yds? Anſ. 31 yds. 1 qr.

30. In 764 ells Engliſh, how many yds? Anſ. 955 yds.

31. In 6 pieces of cloth, each $20\frac{1}{2}$ yds. how many qrs? Anſ. 492 qrs.

LONG MEASURE.

32. Reduce 1 mile, into barley-corns? Anſ. 190080.

33. In 1362240 inches, how many miles? Anſ. $21\frac{1}{2}$.

34. How often will a wheel, of $18\frac{1}{2}$ feet circumfe-ence, turn in running betwixt Edinburgh and Glaſgow; the diſtance being 44 miles? Anſ. $12557\frac{31}{37}$.

35. How many barley-corns, will reach round the world, which is 360 degrees, and each degree $69\frac{1}{2}$ miles? Anſ. 4755801600.

LAND MEASURE.

36. In 20 acres, how many poles? Anſ. 3200 po.

37. In 5700 poles, how many acres? Anſ. 35 ac. ro. 20 po.

38. In 674 ac. 6 po. how many yds? Anſ. $3262341\frac{1}{2}$ ds.

WINE MEASURE.

39. In 15 gal. how many pints? Anſ. 120 pts.

40. In 2 tuns, how many quarts? Anſ. 2016 qts.

41. In 3424 pints, how many hhds? Anſ. 6 hhds. 0 gal.

ALE AND BEER MEASURE.

42. In 20 barrels of beer, how many gallons and quarts? Anſ. 720 gal. 2880 qts.

43. In 36 hhds. of beer, how many barrels? Anſ. 54 bar.

44. In 3392 hhds. of ale, how many hhds. of beer? Anſ. 3015 hhds. 6 gal.

45. In 4608 pints of ale, how many hhds? Anſ. 12 hhds.

DRY MEASURE.

46. In 840 qrs. 3 pecks, how many gallons? Anſ. 53766.

47. In 47 qrs. 6 buſh. 3 pks. 1 gal. 3 pts. how many pints? Anſ. 24507 pints.

48. In 640 pecks of wheat, how many quarters? Anſ. 20 qrs.

TIME.

49. In 1 year of 365 days, 6 hours, how many ſeconds? Anſ. 31557600 ſec.

50. How many days have paſſed ſince the birth of Chriſt to Chriſtmas, 1797? Anſ. 656354 days, 6 hours.

51. How many ſeconds are there in a ſolar year, which conſiſts of 365 days, 5 hours, 48 minutes, and 57 ſeconds? Anſ. 31556937.

52. From March 10, to December 25, (both days included) how many days and hours? Anſ. 291 days, 6984 hours.

53. How long would it require to count five hundred millions of money, at the rate of 100l. a minute, without intermiſſion? Anſ. 9 y. 187 da. 5 ho. 20 mi

SCOTS MONEY, WEIGHTS AND MEASURES.

54. In 200 marks Scots, how many pounds Sterling? Anſ. 11l. 2s. $2\frac{2}{3}$d.

55. In 1 pound Sterling, how many pounds Scots, and marks Scots? Anſ. 12 L. S. 18 M. S.

56. In 200 pounds Scots, how many pounds Sterling? Anſ. 16l. 13s. 4d.

57. In 9 roods, 20 yards of maſon work; how many ſquare feet? Anſ. 3096.

58. In 520 ſtones 12 lb. 14 oz. of cheeſe, how many ounces? Anſ. 133326.

59. In 4600 Engliſh yards, how many Scots ells? Anſ. $4475\frac{25}{37}$.

60. In 50 chalders, 10 bolls, 2 firlots, 1 peck, 2 lippies, how many lippies? Anſ. 51878.

61. How many ſquare ells, in 42 ac. 3 ro. 10 falls? Anſ. 246600.

62. In 25 hogſheads of beer, how many gills? Anſ. 51200.

63. In 218lb. of Dutch butter, each $17\frac{1}{2}$ oz. how many lb. Tron weight, each 22 ounces? Anſ. 173lb. 9 oz.

64. In 240 Tron pounds, each 22 oz. how many pounds Avoirdupois? Anſ. 330.

COMPOUND ADDITION.

RULE.

1. Place all numbers of the ſame denomination directly under one another, and draw a line under them.

2. Add the figures in the loweſt denomination, and find how many of the next higher denomination that ſum contains.

3. Write down the remainder, if any, at the foot of the column, and carry one, for each of the higher denomination, to the next column.

4. Proceed in the ſame manner, through all the denominations, till you come to the higheſt, the ſum of which, together with the ſeveral remainders, will give the anſwer required.

PROOF.

As in Simple Addition.

STERLING MONEY.

Examples.

	10	20	12		10	20	12		10	20	12
	L.	S.	D.		L.	S.	D.		L.	S.	D.
(1.)	6	6	8	(2.)	10	10	$8\frac{1}{4}$	(3.)	360	19	$10\frac{3}{4}$
	4	8	9		24	14	$4\frac{1}{2}$		496	14	$11\frac{1}{2}$
	3	5	6		36	18	$8\frac{3}{4}$		306	18	$9\frac{1}{4}$
	4	9	7		41	14	4		459	19	6
	5	6	6		69	15	5		304	16	$8\frac{3}{4}$
	7	5	4		36	16	2		1900	10	$10\frac{1}{4}$

* Anſ. (1.) 31l. 2s. 4d.——(2.) 220l. 9s. $8\frac{1}{2}$d.——(3.) 3830l. $8\frac{1}{2}$d.

AVOIRDUPOIS WEIGHT. TROY WEIGHT.

	10	20	4		10	16	16		10	12	20	24
	T.	cwt.	qr.		lb.	oz.	dr.		lb.	oz.	dwt.	gr.
(4.)	40	16	2	(5.)	25	14	12	(6.)	20	10	14	16
	56	18			30	15	14		14	11	19	18
	45	14	1		24	14	11		50	8	16	21
	34	19	3		16	10	8		34	6	18	22
	54	16	2		8	7	10		68	4	16	20
	36	15	1		13	6	9		46	1	10	4
	88	14	2		4	14	10		14	10	16	12
	10	10			8	10	15		50	8	14	6
	*											

7. A owes B 450l. 16s. 10d. C 34l. 18s. 9d. D 545l. 16s. 7¾d. E 44l. 14s. 8½d. F 300l. 9s. 10d. and G 84l. 14s. Required A's debt? Anſ. 1461l. 10s. 9¼d.

8. Bought a parcel of goods for 100l. 10s. paid for packing them 18s. 6d. for carriage 1l. 18s. and ſpent about the bargain 12s. 8¾d. what do theſe goods ſtand me? Anſ. 103l. 19s. 2¾d.

9. A ſervant went to market and laid out on beef 10s. 10½d. on mutton 5s. 9½d. on lamb 15s. 6d. on greens 5½d. on fiſh 10s. 3d. on eggs 10¾d. and on butter 6s. 8d. How much was laid out in all? Anſ. 2l. 10s. 5¼d.

10. A owes B for bread 8l. 9s. 6¼d. for cheeſe 5l. 10s. for tea 3l. 11s. 9½d. for ſugar 12l. 10s. 8¾d.

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* Anſ. (4.) 369 Tons, 4 cwt. 3 qr.——(5.) 133 lb. 15 oz. 9 dr.——(6.) 301 lb. 4 oz. 7 dwt. 23 gr.

and for other articles 20l. 8s. 4¾d. What is the amount of A's debt? Anſ. 50l. 10s. 4¾d.

11. What is the ſum of 50 lb. 11 oz. 14 dwt. 20 gr.; 40 lb. 10 oz. 15 dwt.; 62 lb. 8 oz. 20 gr.; 34 lb. 8 oz. 14 dwt.; 36 lb. 4 oz. 10 dwt. 19 gr. and 54 lb. 15 gr? Anſ. 279 lb. 7 oz. 16 dwt. 2 gr.

12. A ſhopkeeper retails of ſugars 3 qrs. 4 lb. 12 oz. 4 dr.; of teas 1 qr. 15 lb. 10 oz.; of coffee 4 cwt. 1 qr. 6 lb. 14 oz.; of tobacco 5 cwt. 3 qrs. and of ſnuff 2 cwt. 2 qrs. 26 lb. 10 oz. 12 dr. What is the weight of the whole? Anſ. 13 cwt. 3 qrs. 25 lb. 15 oz.

13. From A to B is 5 miles, 1 fur. 8 po.; from B to C 19 m. 18 po.; from C to D 6 fur. 18 po. 4 yds. and from D to E 5 m. 36 po. 1 yd. What is the diſtance from A to E? Anſ. 30 m. 1 fur. 5 yds.

14. A draper bought 308 yds. 2 qrs. 1 nl.; 500 yds. 1 qr. 3 nls.; 54 yds. 3 qrs. and 60 yds. 3 qrs. 3 nls. How many yards did the whole contain? Anſ. 924 yds. 2 qrs. 3 nls.

15. A wine-merchant imported 1 tun, 2 hhds. of claret; 2 hhds. 58 gal. of ſherry; 1 hhd. 8 gal. 3 qts. of Liſbon; 3 hhds. 50 gal. 2 qts. of port; How many tuns did he import? Anſ. 3 tuns, 1 hhd. 54 gal. 1 qt.

16. A ſurveyor having meaſured 5 pieces of land, found the firſt to contain 6 ac. 2 ro. 20 po; the ſec~~ond, 20 ac.~~ 1 ro. 15 po.; the third, 15 ac. 3 ro. 4 po.; ~~the fourth,~~ 2 ac. 2 ro. 24 yds. 8 feet; and the fifth, ~~1 ac. 1 ro.~~ 39 po. 28 yds. 5 feet; how many Engliſh

acres, were ſurveyed in whole? Anſ. 46 ac. 2 ro. 39 po. 22¼ yds. 4 f.

COMPOUND SUBTRACTION.

RULE.

1. Place the leſs number under the greater, ſo that thoſe parts, which are of the ſame denomination, may ſtand directly under each other, and draw a line under them.

2. Begin at the right hand, and ſubtract the number of each denomination in the lower line from the number above it, and ſet the remainder under it.

3. But if the lower number of any denomination be greater than the upper, add as many to the upper as make one of the next higher denomination, then ſubtract the lower from that ſum, and add one to the lower number of the next denomination before you ſubtract it; proceed in this manner till the whole is finiſhed.

PROOF.

As in Simple Subtraction.

STERLING MONEY.

Examples.

(1.)	10	20	12	(2.)	10	20	12
	L.	S.	D.		L.	S.	D.
Borrowed	6	14	6	From	20	10	10½
Paid	4	15	8	Take	14	14	8¾
Balance			*	Rem.			
Proof				Proof			

* Anſ. (1.) 1l. 18s. 10d.—(2.) 5l. 16s. 1¾d.

3. From 14l. 10s. 8d. take 10l. 11s. 10¼d. Anſ. 3l. 18s. 9¾d.

4. From 40l. 16s. take 30l. 18s. 6¼d. Anſ. 9l. 17s. 5¾d.

5. From 3045l. take 3000l. 10s. 8d. Anſ. 44l. 9s. 4d.

6. A borrowed from B 100l. and paid him 48l. 16s. 10¾d. What is due to B ? Anſ. 51l. 3s. 1¼d.

7. A merchant had owing him 1000l. 8s. 9d. received at one time 108l. 14s. 4d. at another 112l. 10s. 6¾d. and at a third 258l. 8s. 5½d. What remains due to him ? Anſ. 520l. 15s. 4¾d.

8. A merchant has in caſh 480l. 6s. 7d. goods, value 3005l. 14s. 8d. a houſe 788l. 10s. 6¾d. debts due to him 850l. 18s. 9¼d. He owes A 100l. 6s. 8d. B 70l. 19s. 8d. and C 169l. 16s. 10¾d. Required his ſtock ? Anſ. 4784l. 7s. 4¼d.

9. Bought 20lb. 8 oz. 10 dwt. of ſilver plate ; and ſold 14lb. 8 oz. 14 dwt. 16 grains ; What remains ? Anſ. 5lb. 11 oz. 15 dwt. 8 grs.

10. Bought 4 tons, 6 cwt. 1 qr. of ſugar ; and ſold at one time, 1 ton, 20lb. and at another 1 ton, 10 cwt. 1qr. 4lb. 14 oz. What remains ? Anſ. 1 t. 15 cwt. 3 qrs. 3lb. 2 oz.

11. From 850 yards ; take 500 yds. 2 qrs. 1 nl. Anſ. 349 yds. 1 qr. 3 nls.

12. Bought 4 tuns of wine ; and ſold 2 hhds. 40 gal. 2 qts. What remains ? Anſ. 3 t. 1 hhd. 22 gal. 2 qts.

13. Subtract one farthing from 100l. Anſ. 99l. 19s. 11¾d.

14. An account of houſehold expences.

		Received.			Paid.		
		L.	S.	D.	L.	S.	D.
1797.							
Jan. 1.	On hand,	4	6	8½			
3.	Paid for tea,					4	6
	for ſugar,					3	10½
	for butter,					1	6
10.	for cheeſe,					9	8¾
	for butcher-meat,					1	10
14.	Received,	4	10	6			
20.	Paid Baker's account,				1	14	6
21.	Tailor's do.					10	6½
	Shoemaker's do.				1	18	9
28.	Brewer's do.				1	19	11¾
31.	On hand,		3	10			

COMPOUND MULTIPLICATION.

RULE.

1. When the multiplier does not exceed 12, write it under the loweſt denomination of the multiplicand.

2. Multiply its ſeveral denominations in order, beginning at the loweſt; and carry according to the value of the higher.

3. When the multiplier exceeds 12, and is the product of two or more numbers, neither of which exceeds 12, multiply ſucceſſively by theſe numbers.

PROOF BY DIVISION.

EXAMPLES.

1. What coſt 2 yards at 1s. 4¼d ? Anſ. 2s. 8½d.
2. What coſt 3 yds. at 2s. 8¾d ? Anſ. 8s. 2¼d.
3. What coſt 4 lb. of ſugar at 9½d ? Anſ. 3s. 2d.
4. What coſt 6 lb. of tea at 4s. 6d ? Anſ. 1l. 7s.

5. What coſt 8 lb. of butter at 10¼d? Anſ. 6s. 10d.

6. What coſt 10 lb. cheeſe at 5½d? Anſ. 4s. 7d.

7. What coſt 12lb. of beef at 4¼d? Anſ. 4s. 3d.

8. What coſt 14 lb. of mutton at 3½d? Anſ. 4s. 1d.

9. What coſt 16 lb. veal at 5¾d? Anſ. 7s. 8d.

10. What coſt 24 gallons brandy at 12s. 6d? Anſ. 15l.

11. What coſt 28 firkins herring at 7s. 3½d? Anſ. 10l. 4s. 2d.

12. What coſt 30 lb. candle at 9½d? Anſ. 1l. 3s. 9d.

13. What coſt 36 bolls of meal at 14s. 6¼d? Anſ. 26l. 2s. 9d.

14. What coſt 60 bolls of wheat at 1l. 4s. 6d? Anſ. 73l. 10s.

15. What coſt 72 ſtones of wool at 8s. 6d? Anſ. 30l. 12s.

16. What coſt 100 ſtones of coals at 1¾d? Anſ. 14s. 7d.

4. If the multiplier is not the product of any two or more numbers. Firſt, multiply, by two ſuch numbers, as come neareſt the given multiplier either greater or leſs. Next, multiply the multiplicand by the difference between this number and the multiplier; then add or ſubtract the product from that before found, according as the given number was greater or leſs than the aſſumed number.

17. What is the price of 17 pair of ſhoes at 6s. 3d? Anſ. 5l. 6s. 3d.

18. What is the value of 29 pair of ſtockings at 2s. 6d? Anſ. 3l. 12s. 6d.

19. What coſt 37 pair of buckles at 4s. 4½d? Anſ. 8l. 1s. 10½d.

20. What coſt 46 gallons of whiſky at 10s. 6d? Anſ. 24l. 3s.

21. What coſt 92 ſtones of flax at 9s. 8¾d? Anſ. 44l. 15s. 1d.

5. If the multiplier be large, multiply as many times by ten, as there are figures in the multiplier above the units place; then multiply the product of the laſt ten by the left hand figure, and the product above that of the laſt ten by the next figure, and ſo on till you have multiplied by all the figures in the multiplier; then add the products.

22. What will a man's wages amount to in 253 days at 1s. 4½d. a day? Anſ. 17l. 7s. 10½d.

23. A gentleman has of yearly income 500l. ſpends daily 19s. 1d. reckoning 365 days to a year; how much does he ſpend, and how much does he ſave yearly? Anſ. ſpends 348l. 5s. 5d. ſaves 151l. 14s. 7d.

24. What coſt 4880 cwt. at 18s. 7¼d? Anſ. 4539l. 8s. 4d.

25. What is the weight of 345 hhds. ſugar, each 14 cwt. 1 qr. 20 lb? Anſ. 4977 cwt. 3 qrs. 12 lb.

26. How much wine will 46 caſks contain, each holding 3 hhds. 54 gal. 5 pts? Anſ. 177 hhds. 55 gal. 6 pints.

27. If the inhabitants of a town conſume 14 bolls, 3 firlots, 1 peck, and 2 lippies in a day; how much will they conſume in a year? Anſ. 338 chalders, 9 bo. 3 fir. 3 pks. 2 lip.

28. How much will a mill grind in a year, at 2 qr. 3 buſh. 3 pks. a day? Anſ. 901 qr. 3 pecks.

29. What is the weight of 20 hhds. of tobacco, each 4 cwt. 1 qr. 18 lb. 12 oz? Anſ. 4 tons, 8 cwt. 1 qr. 11lb.

6. When the Multiplier contains a Fraction.

RULE.

Multiply by the upper figure of the fraction, and divide by the lower figure; then add the quotient to the former product.

30. What coſt $8\frac{1}{2}$ yards, at 14s. $6\frac{1}{2}$d? Anſ. 6l. 3s. $7\frac{1}{4}$d.

31. What coſt $12\frac{3}{4}$ lb. at 6s. 2d? Anſ. 3l. 18s. $7\frac{1}{2}$d.

32. What coſt $14\frac{5}{8}$ yards, at 11s. $9\frac{1}{4}$d? Anſ. 8l. 12s. $9\frac{0}{4}$d. $\frac{3}{8}$.

33. Multiply 20 lb. 2 oz. 7 dwt. 21 gr. by 4. Anſ. 80 lb. 9 oz. 11 dwt. 12 gr.

34. Multiply 24 cwt. 1 qr. 14 lb. 10 oz. by 8. Anſ. 195 cwt. 5 lb.

35. Multiply 20 m. 3 fur. 30 po. 2 yds. by 9. Anſ. 184 m. 1 fur. 33 po. $1\frac{1}{2}$ yd.

36. Multiply 120 yds. 2 qrs. 1 nl. by 10. Anſ. 1205 yds. 2 qrs. 2 nls.

37. Multiply 40 ac. 3 ro. 30 po. by 11. Anſ. 45 ac. 1 ro. 10 po.

38. Multiply 28 t. 3 hhds. 24 gal. 3 pts. by 7. Anſ. 201 t. 3 hhds. 44 gal. 5 pts.

BILLS OF PARCELS.

1. A Hoſier's Bill.

Mr John Grant

Bought of James Brown.

				S.	D.
1797.					
Jan. 4.	8 pair worſted	ſtockings	at	2	6
	9 pair thread	Ditto	at	3	1
	7 pair ſilk	Ditto	at	12	$10\frac{1}{2}$
	10 pair cotton	Ditto	at	5	$8\frac{3}{4}$
	4 pair hoſe		at	1	9
			L. 10	2	2

2. A Stationer's Bill.

Mr George Young

1797. Bought of David Scott.

Feb. 15. 20 reams poſt paper, at 1l. 1s.
18 reams foolſcape, at 14s. 6d.
24 reams printing demy, at 18s. 10d.
30 reams royal, at 2l. 4s. 2d.
6 reams cartridge, at 12s. 8d.
4 cwt. paſteboard, at 17s. 6½d.

L. 130 4 2

3. A Woollen Draper's Bill.

Mr Richard Reid

1797. Bought of Joſeph Black.

Feb. 24. 13 yards ſerge, at 3s. 6d.
18 yards drugget, at 1s. 4½d.
25 yards ſcarlet cloth, at 18s. 9d.
14 yards black do. at 17s. 11¾d.
20 yards ſhalloon, at 1s. 10d.
17 yards drab, at 3s. 2d.

L. 44 1 2½

COMPOUND DIVISION.

RULE.

1. Place the diviſor and dividend as in ſimple diviſion.

2. Begin at the higheſt denomination of the dividend, divide as in ſimple diviſion; and reduce the remainder, if any, to the next lower denomination, adding the given number of that name; divide this ſum,

and proceed in the ſame manner with all the denominations. The ſeveral parts of the quotient, thus found, will be the anſwer required.

Proof by Multiplication.

EXAMPLES.

1. Divide 2l. 10s. by 2. Anſ. 1l. 5s.

2. Divide 8l. 6s. 6d. by 3. Anſ. 2l. 15s. 6d.

3. Divide 17l. 13s. by 6. Anſ. 2l. 18s. 10d.

4. Divide 21l. 8s. by 8. Anſ. 2l. 13s. 6d.

5. Divide 271l. 1s. 2¼d. by 9. Anſ. 30l. 2s. 4¼d.

6. Divide 43l. 16s. 0½d. by 10. Anſ. 4l. 7s. 7¼d.

7. Divide 340l. 10s. by 16. Anſ. 21l. 5s. 7½d.

8. Divide 3590l. 12s. 6d. by 53. Anſ. 67l. 14s. 11¼d. $\frac{30}{53}$.

9. Divide 630l. 7s. 8½d. by 365. Anſ. 1l. 14s. 6½d.

10. Divide 345 cwt. 1 qr. 8 lb. by 11. Anſ. 31 cwt. 1 qr. 16 lb.

11. Divide 47 lb. 2 oz. 13 dwt. by 7. Anſ. 6 lb. 8 oz. 19 dwt.

12. Divide 19 lb. 6 oz. 3 dr. 2 ſcr. by 5. Anſ. 3 lb. 10 oz. 7 dr. 8 gr.

13. Divide 540 yds. 3 qrs. 1 nl. by 28. Anſ. 19 yds. 1 qr. 1 nl. $\frac{1}{28}$.

14. Divide 51 ac. 1 ro. 11 po. by 51. Anſ. 1 ac. 1 po.

15. If ſeven caſks weigh 2 tons, 7 cwt. 3 qr. 14 lb. What does one caſk weigh? Anſ. 6 cwt. 3 qr. 10 lb.

16. If 6 lb. of tea coſt 1l. 7s. what will 1 lb. coſt? Anſ. 4s. 6d.

17. Bought 12lb. of beef, for 4s. 3d. What did it coſt the lb? Anſ. 4¼d.

18. Bought 24 Gallons of rum for 15l. what did it coſt per gallon? Anſ. 12s. 6d.

19. If 29 yards of cloth coſt 3l. 12s. 6d. what coſt 1 yard? Anſ. 2s. 6d.

20. A piece of land containing 45 acres is let for 112l. 10s. what does it pay per acre? Anſ. 2l. 10s.

21. If a man ſpend 128l. 11s. 2d. in 12 months, what is that per month? Anſ. 10l. 14s. $3\frac{2}{12}$d.

22. Three men make an adventure, each equally concerned, whereby they clear 740l. what was each man's ſhare of the gain? Anſ. 246l. 13s. 4d.

23. What is the value of 1 yard of cloth, when 84 yards coſt 38l. 10s. Anſ. 9s. 2d.

24. A prize of 3850l. is to be equally divided among 742 ſailors; what is each man's ſhare? Anſ. 5l. 3s. $9\frac{1}{4}$d. 98.

25. A gentleman has 560l. 12s. a year; how much is that a month, a week, and a day? Anſ. 46l. 14s. 4d. a month. 10l. 15s. $7\frac{1}{4}$d. 28. a week. 1l. 10s. $8\frac{1}{2}$d. 166. a day.

26. Divide 117l. 16s. among 9 men, 12 women, and 18 boys; and give each woman double a boy, and each man triple a woman. Anſ. A boy's ſhare 1l. 4s. $6\frac{1}{2}$d. A woman's 2l. 9s. 1d. A man's 7l. 7s. 3d.

When the diviſor is of different denominations.

RULE.

Reduce both diviſor and dividend to the ſame denomination.

27. A gentleman diſtributed 6l. 12s. among ſome poor people, gave each 5s. 6d. How many poor were there? Anſ. 24.

28. The revenues of an infirmary amount to 1152l. 10s. 6d.; how many patients will it maintain, whe each patient requires 9l. 10s. 6d? Anſ. 121.

29. A farm is let at 1l. 2s. 6d. per acre, and the rent amounts to 569l. 16s. 3d. how many acres does it contain? Anſ. 506 acres, 2 roods.

30. How long muſt a tradeſman work, who gain 1s. 4d. a day, in order to pay a debt of 20l. 17s. 4d. Anſ. 313 days.

When the diviſor contains a fraction.

RULE.

Multiply the diviſor and dividend by the under figure of the fraction, adding the upper figure to the product of the diviſor, then divide the products.

31. Divide 276l. 16s. 8d. among 5 men and a boy and give the boy $\frac{2}{3}$ of a man's ſhare. Anſ. A man' ſhare 48l. 17s. 0$\frac{1}{2}$d. $\frac{14}{17}$. Boy's ſhare 32l. 11s. 4$\frac{1}{4}$d. $\frac{15}{17}$

32. A, B and C have a ſhip in company: A hat $\frac{5}{8}$; B $\frac{1}{4}$ and C $\frac{1}{8}$: they receive of freight for a voyag 114l. 8s. 4d. What is each man's ſhare of the freight Anſ. A's ſhare 71l. 10s. 2$\frac{1}{2}$d. B's 28l. 12s. 1d. C' 14l. 6s. 0$\frac{1}{2}$d.

BILLS OF PARCELS.

4. A Grocer's Bill.

Mr Robert Roſs

1797. Bought of William Smith

March 1.	24 lb. lump ſugar	at 10$\frac{1}{2}$d.
	26 lb. powder Do.	at 8$\frac{3}{4}$d.
	16 lb. ſoap	at 7$\frac{1}{4}$d.
	4 lb. ſtarch	at 1s. 2d.
	15 lb. tea	at 4s. 6d.

L. 6 1 9

5. A Leather-Merchant's Bill.

Mr Gilbert Bruce

1797. Bought of James Skinner.

April 5.	28 calf-ſkins	at	4s. 8½d.
	29 lamb Do.	at	8¼d.
	34 ſheep Do.	at	1s. 3d.
	17 buck Do.	at	8s. 6d.
	18 cow hides	at	12s. 7¾d.
	110 lb. leather	at	2s. 8d.

L. 42 19 8¾

6. A Linen Draper's Bill.

Mr Charles Ruſſel

1797. Bought of Adam Waugh.

May 20.	45 yards Cambric	at	11s. 6d.
	35 yards Muſlin	at	4s. 8¼d.
	26 yards Linen	at	3s. 4d.
	23¼ yards Holland	at	5s. 3¼d.
	10½ ells Diaper	at	1s. 4½d.
	13¾ ells Dowlaſs	at	1s. 6d.

L. 46 5 10$\frac{0}{4}$. ¼

7. A Druggiſt's Bill.

Mr Samuel Orr

1797. Bought of Jones Paul.

June 5.	18½lb. Rhubarb	at	1l. 10s. per lb.
	14 lb. Opium	at	18s. 11¼d.
	37¼lb. Gum Arabic	at	1s. 10d.
	112lb. Jeſuits bark	at	3s. 6d.

L. 64 0 5

Teaches from three given numbers to find a fourth.

Of the three given numbers, two are always of the ſame kind, the other is of the ſame kind, as the fourth, or number required in the queſtion.

RULE.

1. Write down that number, which is of the ſame kind or ſpecies, with the number required, in the middle, with two points before it, and four after it.

2. Conſider from the ſenſe of the queſtion, whether the anſwer ought to be greater or leſs than this number; if greater, place the leaſt of the other two numbers on the left hand, for the firſt, and the other on the right: but if leſs, place the greateſt for the firſt.

3. If the firſt and third numbers are of different denominations, reduce them into the ſame, and the ſecond number into the loweſt denomination mentioned.

4. Multiply the ſecond and third numbers together, and divide their product by the firſt, the quotient is the anſwer, if there be no remainder, and is always of the ſame denomination with the ſecond number.

5. If there be a remainder, reduce it to the next lower denomination, and divide by the ſame diviſor: proceed thus with all the remainders, till you have reduced them to the loweſt denomination which the ſecond number admits of, and the ſeveral quotients will be the anſwer required.

PROOF.

Invert the queſtion.

Then, as the third number, is to the anſwer found; ſo is the firſt, to the ſecond.

Note 1. Multiply and divide as in compound multiplication and diviſion, when found convenient.

2. If the firſt number, and either the ſecond or third, can be exactly divided by the ſame diviſor, let them be divided, and the quotients uſed inſtead of the original numbers.

N. B. To find a common meaſure: Divide the diviſor by the remainder continually till nothing remain, the laſt diviſor is the common meaſure; then divide the remainder and diviſor by it, and the quotient will be the loweſt terms.

EXAMPLES.

1. If 2 yards of cloth coſt 4s. 6d. what will 16 yards coſt? Anſ. 1l. 16s.

2. If 16 yards of cloth coſt 1l. 16. what will 2 yards coſt? Anſ. 4s. 6d.

3. If 4½ yards coſt 12s. 8d. what will 20 yards coſt? Anſ. 2l. 16s. 3½d. $\frac{2}{9}$.

4. If 20 yards coſt 2l. 16s. 3½d. $\frac{2}{9}$ what will 4½ yards coſt? Anſ. 12s. 8d.

5. If 1¼ yard coſt 2s. 6d. what coſt 2½ yards? Anſ. 2l. 9s.

6. If 24½ yards coſt 2l. 9s. what will 1¼ yard coſt? Anſ. 2s. 6d.

7. If 1 lb. of ſugar coſt 10½d. what will 1 cwt. coſt? Anſ. 4l. 18s.

8. If 1 cwt. of ſugar coſt 4l. 18s. what will 1 lb. coſt? Anſ. 10½d.

9. If 1 oz. of tea coſt 4¼d. what will 24lb. coſt? Anſ. 6l. 16s.

10. If 24lb. coſt 6l. 16s. what will ounce coſt? Anſ. 4¼d.

11. If 1 oz. of coffee coſt 6½d. what will 2½ cwt. coſt? Anſ. 121l. 6s. 8d.

12. If 2½ cwt. of coffee coſt 121l. 6s. 8d. what will 1 oz. coſt? Anſ. 6½d.

13. If three quarters of cloth coſt 3s. 6d. how much will 3 pieces, each 30½ yards, coſt? Anſ. 21l. 7s.

14. If 3 pieces of cloth, each 30½ yards coſt 21l. 7s. what will ¾ of a yard coſt? Anſ. 3s. 6d.

15. If 4 cwt 1 qr. 14 lb. of tobacco coſt 40l. 16s. 8d. what coſt 1ounce? Anſ. 1¼d.

16. If one oz. coſt 1¼d. what will 4 cwt. 1 qr. 14 lb. coſt? Anſ. 40l. 16s. 8d.

17. If 1½ ounce of ſnuff coſt 2½d. what coſt 5 cwt. 3 qrs. 18lb.? Anſ. 73l. 11s. 1¼d. ⅓.

18. If 5 cwt. 3 qrs. 18 lb. coſt 73l. 11s. 1¼d. ⅓. what coſt 1½ oz.? Anſ. 2½d.

19. If 1½ pound of potatoes coſt 1½d. what will 2 ton weight coſt? Anſ. 18l. 13s. 4d.

20. What muſt I pay for a pipe of wine at 13s. 4d. the gallon? Anſ. 84l.

21. If 3½ cwt. of cheeſe coſt 8l. 11s. 6d. what is that per lb.? Anſ. 5¼d.

22. What is the price of 10 cheeſes, each 15¼ lb. at 6¾ the lb.? Anſ. 4l. 5s. 9¼d. ½.

23. A gentleman ſpends 2l. 10s. 6½d. a day, and puts into the bank, at the year's end, 500l. what was his yearly income? Anſ. 1422l. 7s. 8½d.

24. If the daily expences of the inhabitants of Edinburgh and Leith be 3240l. 9s. 9½d. for maintenance; how much will ſupport them 2½ years? Anſ. 2956946l. 14 10¾d.

25. If 1 ell of cloth coſt 7s. 4d. what coſt 1 yard? Anſ. 5s. 10¼d. ⅗.

26. If a ton of iron coſt 23l. 6s. 8d. what did it coſt per lb.? Anſ. $2\frac{1}{2}$d.

27. A labourer receives 1s. 4d. a day for every work day; how much do his wages amount to in a year? Anſ. 20l. 17s. 4d.

28. A farm, containing 400 acres, 2 ro. 20 poles, is let at 2l. 2s. per acre; what is the yearly rent of that farm? Anſ. 841l. 6s. 3d.

29. If 1 quarter of oats coſt 18s. 8d. how much will 61 quarters 7 buſhels coſt? Anſ. 57l. 15s.

30. If 100 yards of cloth coſt 20l. 9s. 4d. how many yards may I buy for 6s. $4\frac{3}{4}$d? Anſ. 1 yd. 2 qrs. 1 nl.

31. If 4 caſks of raiſins, each weighing 1 cwt. 2 qrs. 16 lb. coſt 23l. I demand the value per cwt.? Anſ. 3l. 10s.

32. What will the tax of 900l. amount to, at 2s. 6d. the pound? Anſ. 112l. 10s.

33. A bankrupt owes his creditors 1200l. pays them only 750l. how much does he pay them per pound? Anſ. 12s. 6d.

34. A bankrupt pays his creditors 12s. 6d. per pound, pays them in all 750l. what was his debt? Anſ. 1200l.

35. A bankrupt owes his creditors 9000l. 10s. how much will he pay them at 15s. 6d. per pound? Anſ. 6975l. 7s. 9d.

36. If 1 dwt. of gold coſt 4s. what coſt 6 pieces, each $2\frac{1}{4}$ lb.? Anſ. 648l.

37. If 1 $\frac{3}{4}$ ounce of ſilver plate coſt 9s. $7\frac{1}{2}$d. what is the price of 24 $\frac{1}{2}$ lb.? Anſ. 80l. 17s.

38. If 14 packs of wool, each 18 ſtones, tron weight, coſt 109l. 4s. what is that per lb.? Anſ. $6\frac{1}{2}$d.

39. A trader bought 100 lb. of tea at 5s. 6d. per lb. but not anſwering in goodneſs, he is willing to loſe 2l. 10s. upon the whole, at what rate muſt he retail it per ounce? Anſ. 3¾d.

40. If 30 gallons of water in 1 hour fall into a ciſtern, containing 200 gallons, and there run out 22½ gallons in one hour; in how many hours will the ciſtern be filled, if both the cocks keep running? Anſ. 26 hours, 40 minutes.

41. If 2 cwt. 2 qrs. 24 lb. of ſoap be bought for 8l. 13s. 4d. at how much muſt it be ſold per lb. to gain 2l. 2s. on the whole? Anſ. 8½d.

42. A merchant bought 4 tuns of oil for 640l. it leaked out 48 gallons; at what rate muſt he ſell it per gallon, ſo as to be no loſer by it? Anſ. 13s. 4d.

43. A draper bought 240 yards of broad cloth, and gave for it after the rate of 16s. 10½d. the ell Engliſh; how much did he pay for the whole? Anſ. 162l.

44. The valued rent of a pariſh amounts to 5840l. and a rate is granted of 109l. 10s. for the poor; what is that per pound? Anſ. 4½d.

45. A garriſon has proviſions for 8 months, at the rate of 14 oz. to each perſon per day; how much muſt be allowed per day, in order that the proviſions may laſt 10½ months? Anſ. 10 oz. 10⅔ dr.

46. What is the intereſt of 47l. for a year at 4½l. per cent? Anſ. 2l. 2s. 3½d. ⅖.

47. If 14 men perform a piece of work in 6 days, working 10 hours a day, in what time will 24 men perform it? Anſ. 3 days, 5 hours.

48. If the ſixpence loaf weigh 3 lb. when wheat is at 30s. how much ſhould it weigh when wheat is at 1l. 4s.? Anſ. 3 lb. 12 oz.

49. What coſt 50 Scots pints of whiſky, at $3\frac{1}{2}$d. the gill? Anſ. 11l. 13s. 4d.

50. What coſt 450 wethers, at 15l. 12s. 6d. the clad ſcore? Anſ. 334l. 16s. 5d. $\frac{1}{7}$.

51. How many ſpindles of yarn will it require to warp 200 yards of cloth, 19 hundred in the reed? Anſ. 65 ſpindles, 3 ſlips, 10 cuts, 80 threads. As 1 yard : 1900 threads : : yards : ſpindles.

52. What is the value of $900\frac{1}{2}$ Scots acres of land at three farthings per ell? Anſ. 16209l.

53. How much cloth at 6s. 8d. per yd. ought to be given in barter, for 13 cwt. 2 qrs. of ſugar, at 3l. 2s. 6d. per cwt.? Anſ. 126 yds. 2 qrs. 1 nl.

54. If a tailor can make a coat and veſt with $3\frac{3}{4}$ yards of cloth which is $1\frac{1}{2}$ yd. broad; how many yds. will he require to make the ſame, when the breadth is only 3 qrs.? Anſ. $7\frac{1}{2}$ yds.

55. If $40\frac{1}{2}$ yards of paper, yard wide, be ſufficient to paper a room; how many yards 5 quarters wide will do it? Anſ. 32 yds. 1 qr. $2\frac{2}{5}$ nls.

56. Bought for ready money $400\frac{1}{2}$ yards of ſhalloon at 1s. $8\frac{1}{4}$d. a yd.—$54\frac{1}{4}$ yards of flannel at 1s. 6d.—20 bolls of meal at 14s. $6\frac{1}{2}$d.—106 lb. clover ſeed at $8\frac{3}{4}$d.—$14\frac{1}{2}$ ſtones iron at 3s. $9\frac{1}{2}$d.—31 caſks train oil at 1l. 4s. 6d. I demand the price of the whole? Anſ. 96l. 19s. $9\frac{3}{4}$d. $\frac{1}{2}$.

57. Shipped per the Roſelle for Jamaica, John Liddell maſter, 24 tons, 8 cwt. 1 qr. of cheeſe at $5\frac{1}{4}$d. per lb.—$70\frac{1}{4}$ yds. linen at 2s. 6d.—58 pieces of ſtuff, each $30\frac{1}{2}$ yards at 1s. $4\frac{1}{4}$d.—140 barrels beef at 2l. 4s. 8d.—$40\frac{1}{2}$ ditto pork at 2l. 16s. 6d. and 60 firkins

herrings at 7s. 6½d. what does the whole amount to? Anſ. 1774l. 9s. 5¾d.

58. Bartered 20½ cwt. ſugar at 3l. 4s.—150 lb. tea at 4½d. per ounce; for 96¼ yds. calicoes at 4s. 2d. and 144¾ yds. diaper at 2s. 4½d, how much money muſt be received beſides the above? Anſ. 73l. 7s. 2$\frac{0}{4}$d. ½.

8. Book Debts,

Mr James Brown Dr.
1797. To John Green.
Edin. June 3. To 305½ buſhels ſalt at 2s. 6d. per buſh.
24. To 40¼ reams paper at 17s. 6¾d per ream.
July 20. To 6½ hhds. rum at 13s. 4d. per gal.
26. To 24 tons, 10 cwt. 2 qrs. cheeſe at 6¼d. per lb.
Aug. 1. To 1 ton, 1 qr. 7½ lb. ſugar at 8½d. per lb.
14. To 4½ hhds. whiſky at 2¼d. per gill.
Sept. 7. To 14 chalders, 10 bolls, 3 firlots, 2½ pks. of meal at 10½d. the peck.

L.2108 11 7½¾

COMPOUND PROPORTION,

From five given numbers finds a ſixth, or from ſeven given numbers finds an eighth, or from nine given numbers finds a tenth, &c.

A General Rule for all Proportions.

1. Set down for the middle term that number which is of the ſame ſpecies with the thing required in the queſtion; and on the left of it all the terms which expreſs the conditions of the queſtion; place the remaining terms on the right of the middle in the following order, viz. The firſt on the right hand of the middle term of the ſame ſpecies and denomination with the firſt on the left, the ſecond the ſame with the ſecond on the left, the third the ſame with the third on the left, *&c.*

2. Compare all the terms on the left hand with the middle term, and the correſponding or ſimilar ones on the right, as in ſimple proportion, and at every compariſon, let the diviſors be diſtinguiſhed by putting a point over them.

3. Multiply all the terms together marked for diviſors, and the remaining terms for a dividend.

4. Divide the dividend by the diviſor, and the quotient is the anſwer, and of the ſame denomination with the middle term.

Or otherwiſe thus:

The three firſt terms are a ſuppoſition; the two laſt a demand.

RULE.

1. Let the principal cauſe of loſs or gain, intereſt or decreaſe, action or paſſion, be put in the firſt place.

2. Let that which betokeneth time, diſtance of place, and the like, be put in the ſecond place; and the remaining one in the third.

3. Place the other two terms, under their like, in the ſuppoſition.

4. If the blank fall under the third term, multiply the firſt and ſecond terms for a diviſor, and the other three for a dividend.

5. But, if the blank fall under the firſt or ſecond term, multiply the third and fourth terms for a diviſor, and the other three for a dividend; the quotient is the anſwer, and of the ſame denomination with the term which ſtands above the blank.

PROOF.

By varying the queſtion.

NOTE.

When any one term is reduced, its correſponding term muſt be reduced to the ſame denomination.

Ex. 1. If 100l. in 12 months gain 5l. of intereſt, what will 60l. gain in 9 months? Anſ. 2l. 5s.

2. If 100l. in twelve months gain 5l. intereſt, what principal will gain 2l. 5s. in 9 months? Anſ. 60l.

3. If 100l. gain 5l. in 12 months, in what time will 60l. gain 2l. 5s? Anſ. 9 months.

4. If the intereſt of 60l. for 9 months be 2l. 5s. required the rate per cent. per annum? Anſ. 5l.

5. If 3 horſes in 7 days eat 14 pecks of corn, what quantity will ſerve 24 horſes 52 weeks? Anſ. 364 bolls.

6. If 2 horſes plough 4½ acres of land in 6 days, when they work 8 hours a day; how many acres will 16 horſes plough in 156 days, when they work 12½ hours a day? Anſ. 1462 ac. 2 ro.

7. If 12 reapers in 6 days cut 14 acres of corn, how many acres will 48 reapers cut in 24 days ? Anſ. 224 acres.

8. If 20 roods of ditching be wrought by 4 men in 12 days, working 14 hours a day ; how much will be done by 6 men in 4 days, when they only work 8 hours a day ? Anſ. 5 roods, 25 yds. $6\frac{3}{7}$ feet.

9. If 20 maſons build a wall 50 feet long, 2 feet thick, and 14 feet high, in 12 days ; in how many days will 60 maſons build a wall 500 feet long, 4 thick, and 16 high ? Anſ. $91\frac{3}{7}$ days.

PRACTICE

Is ſo called, from the great uſe thereof, by perſons concerned in trade and buſineſs.

TABLE.

D.	S.	S.	L.	lb.	cwt.
1	= $\frac{1}{12}$	1	= $\frac{1}{20}$	56	= $\frac{1}{2}$
$1\frac{1}{2}$	= $\frac{1}{8}$	1 8	= $\frac{1}{12}$	28	= $\frac{1}{4}$
2	= $\frac{1}{6}$	2	= $\frac{1}{10}$	16	= $\frac{1}{7}$
3	= $\frac{1}{4}$	2 6	= $\frac{1}{8}$	14	= $\frac{1}{8}$
4	= $\frac{1}{3}$	3 4	= $\frac{1}{6}$	lb.	qr.
6	= $\frac{1}{2}$	4	= $\frac{1}{5}$	14	= $\frac{1}{2}$
		5	= $\frac{1}{4}$	7	= $\frac{1}{4}$
		6 8	= $\frac{1}{3}$	4	= $\frac{1}{7}$
		10	= $\frac{1}{2}$	$3\frac{1}{2}$	= $\frac{1}{8}$

EXAMPLES:

400 lb. at $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$d. Anſ. 8s. 4d.---16s. 8d.---1l. 5s.

560 yds. at $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$d. Anſ. 2l. 18s. 4d.---3l. 10s.---4l. 1s. 8d.

430 at $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$d. Anſ. 4l. $7\frac{1}{2}$d.---4l. 9s. 7d.—4l. 18s. $6\frac{1}{2}$d.

96 at 3¼, 3½, 3¾d. Anſ. 1l. 6s.---1l. 8s.---1l. 10s.
84 at 4¼, 4½, 4¾d. Anſ. 1l. 9s. 9d.---1l. 11s. 6d, —1l. 13s. 3d.
54 at 5¼, 5½, 5¾d. Anſ. 1l. 3s. 7½d.---1l. 4s. 9d.---1l. 5s. 10½d.
45 at 6¼, 6½, 6¾d. Anſ. 1l. 3s. 5¼d.---1l. 4s. 4½d.---1l. 5s. 3¾d.
58 at 7¼, 8½, 9¾d. Anſ. 1l. 15s. 0½d.---2l. 1s. 1d.---2l. 7s. 1½d.
57 at 10¼, 11½d. Anſ. 2l. 8s. 8¼d.---2l. 14s. 7½d.
100 at 1s. 1¼d. Anſ. 5l. 10s. 5d.
200 at 2s. 2½d. Anſ. 22l. 1s. 8d.
256 at 3s. 3¾d. Anſ. 42l. 8s.
40 at 4s. 4¼d. Anſ. 8l. 14s. 2d.
37 at 5s. 5½d. Anſ. 10l. 1s. 11½d.
24 at 6s. 6¼d. Anſ. 7l. 16s. 6d.
19 at 7s. 7½d. Anſ. 7l. 4s. 10½d.
12 at 8s. 8¾d. Anſ. 5l. 4s. 9d.
18 at 9s. 9¼d. Anſ. 8l. 15s. 10½d.
300 at 10s. 10½d. Anſ. 163l. 2s. 6d.
408 at 11s. 11¾d. Anſ. 244l. 7s. 6d.
50 at 12s. 1¼d. Anſ. 30l. 5s. 2½d.
55 at 13s. 2½d. Anſ. 36l. 6s. 5½d.
68 at 14s. 3¼d. Anſ. 48l. 10s. 5d.
54 at 15s. 4½d. Anſ. 41l. 10s. 3d.
490 at 16s. 5¼d. Anſ. 402l. 14s. 4½d.
454 at 17s. 6½d. Anſ. 398l. 3s. 11d.
898 at 18s. 7¾d. Anſ. 837l. 3s. 11½d.
405 at 19s. 8¼d. Anſ. 398l. 13s. 5¼d.

TARE AND TRET.

Groſs weight is the full weight of any merchandiſe, together with that of the caſk or other package, in which it is contained.

Tare is an allowance made to the purchaſer for the weight of the package.

Tret is an allowance of 4lb. on 104, or $\frac{1}{26}$ on goods ſubject to waſte.

Cloff is an allowance of 2 lb. on every 3 cwt. for the turn of the ſcale: after tare and tret are deducted.

Suttle is when part of the allowance is deducted from the groſs.

Neat weight is what remains after all allowances are made.

Ex. 1. What is the neat weight of 6 hhds. of tobacco, weighing 95 cwt. 2 qrs. 8 lb. groſs; tare 7 lb. per cwt. tret 4 lb. per 104 lb. cloff 2 lb. for 3 cwt? Anſ. 85. cwt. 2 qrs. 17 lb, &c.

PARTNERSHIP.

RULE.

As the whole ſtock, or ſum: is to each particular ſtock, or number: : So is the whole gain or loſs, or the number to be divided: to the parts ſought.

PROOF.

Add the quotients.

Ex. 1. Divide 140l. between three perſons, ſo that their ſhares ſhall be to each other as 1, 2, and 3. Anſ. 23l. 6s. 8d. 46l. 13s. 4d. 70l.

2. Three merchants trade together, A puts in 30l. B 40l. and C 56l. they gained 130l. what is each man's ſhare of the gain? Anſ. A's 30l. 19s. 0½d. 36. B's 41l. 5s. 4¼d. 6. C's 57l. 15s. 6½d. 84.

3. A Bankrupt is indebted to B 250l. to C 280l. to D. 300l. and to E 102l. 10s.; his eſtate is worth only 600l. how muſt it be divided among his creditors? Anſ. B's 160l. 17s. 1¾d. 1105. C's 180l. 3s. 2½d. 790. D's 193l. 7d. 580. E's 65l. 19s. 0¼d. 1255.

4. A common, conſiſting of 200 acres, is to be divided among R, S, and T, in proportion to their eſtates; R's eſtate is worth 300l. S's 350l. T's 200l. what is each man's ſhare of the common? Anſ. R's 70 ac. 2 ro. 14 po. 10. S's 82 ac. 1 ro. 16 po. 40. T's 47 ac. 9 po. 35.

5. A, B, and C, join ſtocks in trade; their ſtocks amount to 200l. A's gain was 3l. B's 5l. and C's 8l. what was each man's ſtock? Anſ. A's 37l. 10s. B's 62l. 10s. and C's 100l.

6. The effects of a bankrupt amount to 1080l. 10s. and he owes A 240l. 10s.; B 150l. 15s. 6d.; C 456l. 12s.; D 145l.; E 380l. 5s.; and F 48l. 7s. 6d. How much can he afford to pay per pound? and what will each creditor receive? Anſ. per pound, 15s. 2¼d. 2013.

	L.	S.	D.	
A	182	16	1½	2238.
B	114	12	1¼	2081.
C	347	1	4	1984.
D	110	4	3¾	1899.
E	289		7¾	1387.
F	36	15	4¾	1783.

7. The ſtock of a trading company is 21804l. 16s. 0½d. and conſiſts of 84 ſhares; what is C's ſtock, who has 7 ſhares? Anſ. 1795l. 13s. 9½d.

Divide the ſtock by 84 and multiply the quotient by 7.

When the times of continuing the ſtock in company are unequal.

RULE.

Multiply each ſum into its reſpective time.

8. Three graziers rent a piece of land at 30l. 10s. A puts in 12 ſheep for 3½ months, B puts in 8 ſheep for 8½ months, and C puts in 10 for 5 months; how much muſt each pay of the rent? Anſ. A 8l. 1½d. B 12l. 19s. 3d. and C 9l. 10s. 7½d.

9. Two merchants enter into partnerſhip for 16 months, A puts in at firſt 250l. and at 8 months end he puts in 80l. more; B puts in at firſt 360l. and at 12 months end took out 90l. they gained 510l. what is each man's juſt ſhare? Anſ. A's 235l. 13s. 11¼d. 324. B's 274l. 6s. 0½d. 680.

INTEREST

Is the allowance given by the borrower of any ſum of money to the lender.

Principal is the money lent.

Rate per cent. is the ſum agreed on.

Amount is the principal and intereſt added together.

To find the intereſt for one year.

Rule. Multiply the principal by the rate per cent. and divide by 100.

To find the intereſt for ſeveral years.

Rule. Multiply the intereſt for one year by the number of years.

Ex. 1. What is the intereſt of 85l. for a year, at 5l. per cent.? Anſ. 4l. 5s.

2. What is the intereſt of 108l. 10s. for a year, at 4l. per cent.? Anſ. 4l. 6s. 9½d.

3. What is the intereſt of 1000l. at 4½l. per cent.? Anſ. 45l.

4. What is the amount of 40l. 10s. for three years, at 3½l. per cent.? Anſ. 44l. 15s.

5. What is the intereſt of 450l. 8s. 6d. for 4¾ years, at 5 per cent.? Anſ. 106l. 19s. 5¾d.

6. What is the intereſt of 845l. 10s. for ¼ of a year, at 5l. per cent.? Anſ. 10l. 11s. 4½d.

Note. Commiſſion, brokerage, inſurance, and purchaſing of ſtocks, are calculated by the following

Rule. Multiply the ſum by the rate, and divide the product by 100. If the rate contain a fraction, take proportional parts.

7. What is the commiſſion on 345l. at 2½l. per cent.? Anſ. 8l. 12s. 6d.

8. What is the brokerage of 152l. at 4s. 6d. per cent.? Anſ. 6s. 10d. *&c.*

9. What is the inſurance of 195l. 5s. at 10½l. per cent.? Anſ. 20l. 10s. 0¼d. ⅕.

10. What is the purchaſe of 710l. South Sea ſtock, at 103⅝l. per cent.? Anſ. 735l. 14s. 9d.

11. What is the purchaſe of 918l. 14s. Bank ſtock, at 127 ¾l. per cent.? Anſ. 1173l. 12s. 9¼d. $\frac{17}{25}$.

12. What is the purchaſe of 816l. Bank annuities at 85⅜l. per cent.? Anſ. 696l. 13s. 2¼d. ⅗.

13. What is the purchaſe of 2018l. 15s. 6d. India ſtock, at 140¼l. per cent.? Anſ. 2831l. 6s. 7½d. $\frac{33}{50}$.

To calculate intereſt at 5 per cent. for days.

Rule. Multiply the principal by the number of days, and divide the product by 7300.

To calculate intereſt at any other rate.

Rule. Multiply the intereſt found at 5 per cent. by the given rate, and divide by 5.

OR :

To calculate intereſt, at any rate per cent. for days.

Rule. Multiply the principal by the number of days, and by double of the rate per cent. then divide the product by 73000.

14. What is the intereſt of 1000l. 10s. 6d. for 12 days at 5l. per cent.? Anſ. 1l. 12s. $10\frac{1}{2}$d. $\frac{1662}{1825}$.

15. What is the intereſt of 345l. for 80 days, at 5l. per cent.? Anſ. 3l. 15s. $7\frac{1}{4}$d. 43.

16. What is the intereſt of 250l. 10s. 6d. for 40 days, at 5l. per cent.? Anſ. 1l. 7s. $5\frac{1}{4}$d. 101.

17. What is the intereſt of 184l. from 12th May to 19th November, at 5l. per cent.? Anſ. 4l. 16s. $3\frac{1}{4}$d. $\frac{247}{365}$.

18. What is the intereſt of 408l. for 60 days, at 4l. per cent.? Anſ. 2l. 13s. $7\frac{3}{4}$d. 157.

19. What is the intereſt of 351l. from 5th March to 6th Auguſt at $4\frac{1}{2}$l. per cent.? Anſ. 6l. 13s. $3\frac{1}{4}$d. $\frac{1139}{1825}$.

When partial payments are made.

Rule. Multiply the principal and the different balances by the number of days they are at intereſt. Add theſe products and divide the ſum by 7300.

20. A bill of 400l. was due April 20, of which 110l. was paid June 15; 28l. Auguſt 4; and the balance October 2. Required how much intereſt is due at 5l. per cent.? Anſ. 7l. 3s. 5¼d. 318.

To calculate intereſt on accounts current.

Rule. Add and ſubtract the ſums paid and received, in the order of their dates; and if the balance be ſometimes due to the one party, and ſometimes to the other, the products muſt be extended in different columns.

21. Required the intereſt on the following account from January 8 to July 30, allowing 5 per cent. when the balance is due to B. D. and 4 per cent. when due to M. N.

Dr. Mr B. D. his account current with M. N. Cr.

			L.				L.
Jan.	8	To balance	100,	Mar.	15	By caſh	250,
Feb.	14	To caſh	114,	May	30	By caſh	100,
April	24	To caſh	400,	July	2	By caſh	400.
June	18	To caſh	70,				

Anſ. Balance due B. D. 3l. 2s. 8d.

DISCOUNT

Is an allowance given for the payment of any ſum of money before it becomes due.

To find the preſent worth.

Rule. As the amount of 100l. for the given rate and time:
Is to 100l::
So is the debt:
To the preſent worth.

To find the diſcount.

Rule. As the amount of 100l. for the given rate and time :
Is to the intereſt of 100l. for that time : :
So is the given ſum or debt :
To the diſcount.

Ex. 1. What is the preſent worth of 240l. due 100 days hence at 5l. per cent ? Anſ. 236l. 15s. $1\frac{1}{2}$d. $\underline{62910}$

2. What ready money will diſcharge a debt of 560l. 10s. due 48 days hence at 5l. per cent ? Anſ. 556l. 16s. $9\frac{1}{2}$d. $\underline{12854}$

3. Required the diſcount of 1000l. due 70 days hence at 5l. per cent ? Anſ. 9l. 9s. 10d. $\underline{406}$

4. What is the diſcount of 284l. 8s. 6d. for 184 days at $3\frac{1}{2}$l. per cent ? Anſ. 4l. 18s. $6\frac{3}{4}$d. $\underline{84681}$

5. Sold goods for 842l. 5s. to be paid 350 days hence, what is the preſent worth at 5l. per cent ? Anſ. 803l. 14s. 5d. $\underline{18414}$

EQUATION OF PAYMENTS

Is the finding a time, at which a debt, due at different times, may be diſcharged at once, without diſadvantage to either party.

RULE.

Multiply each payment by the time at which it is due ; divide the ſum of the products by the amount of the debt, the quotient is the time required.

Ex. 1. I owe B 100l. payable in 50 days, 130l. in 40 days, 230l. in 140 days ; at what time ſhould I pay the whole together ? Anſ. $92\frac{4}{23}$ days.

2. Paid 480l. as follows: 60l. in 40 days, 180l. in 96 days, 50l. in 200 days, and the reſt in a year and 45 days; required the equated time for paying the whole? Anſ. $224\frac{1}{8}$ days.

COMPOUND INTEREST

Is calculated by making the amount at each ſtated time of payment, the principal for the next.

Ex. 1. What is the amount of 300l. in 4 years, at 5l. per cent. per annum? Anſ. 364l. 13s. $0\frac{1}{4}$d. $\frac{4}{5}$.

2. Required the intereſt of 500l. for 3 years at 4l. per cent? Anſ. 62l. 8s. $7\frac{1}{2}$d. $\frac{4}{5}$.

3. What is the intereſt of 129l. 15s. for 3 years, 9 months and ten days, at $4\frac{1}{2}$l. per cent? Anſ. 23l. 9s. 11d. &c.

PROFIT AND LOSS.

Caſe I. Given the buying and ſelling price, to diſcover the profit or loſs per cent.

Rule. As the prime coſt,
Is to the profit or loſs on it;
So is 100,
To the profit or loſs on it.

Ex. 1. Bought a hogſhead of wine for 50l. 8s. and ſold it for 63l. what did I gain per cent? Anſ. 25l.

2. Bought cloth at 4s. 6d. per yard, and ſold it at 4s. 10d. what was the gain per cent.? Anſ. $7\frac{11}{27}$l.

3. Bought cloth at 18s. 6d. per yard, and ſold it at 15s. 4d. what was the loſs per cent.? Anſ. $17\frac{13}{111}$l.

4. How much per cent. is $3\frac{1}{2}$d. per ſhilling? Anſ. $29\frac{1}{6}$.

Caſe II. Given the prime coſt, and rate per cent. to find the ſelling price.

Rule. As 100,
Is to 100 with the rate per cent. added, in caſe of gain, or ſubtracted, in caſe of loſs;
So is the prime coſt,
To the ſelling price.

5. If I gained 25l. per cent. by wine which I bought at 50l. 8s. per hhd. what did I ſell it at? Anſ. 63l. per hhd.

6. Bought cloth at 4s. 6d. per yard, at what muſt I ſell it, to gain $7\frac{11}{27}$. per cent.? Anſ. 4s. 10d.

7. Bought a cwt. of ſugar for 3l. 3s. at what rate muſt I ſell it per lb. to gain 12l. per cent.? Anſ. $7\frac{1}{2}$d. $\frac{6}{25}$.

8. Bought ſugar at $8\frac{1}{2}$d. per lb. at what muſt I ſell it per lb. to gain $17\frac{11}{17}$l. per cent by it? Anſ. 10d.

Caſe III. Given the ſelling price, and rate per cent. profit or loſs, to find the prime coſt.

Rule. As 100, with the rate per cent. added, or ſubtracted,
Is to 100;
So is the ſelling price,
To the prime coſt.

9. If I gain $17\frac{11}{17}$l. per cent. on ſugar I ſold at 10d. the lb. what was the prime coſt? Anſ. $8\frac{1}{2}$d.

10. Loſt 8l. per cent. on tea, which I ſold at 5s. 6d. per lb. what was the prime coſt? Anſ. 5s. $11\frac{1}{2}$d. $\frac{22}{25}$.

Caſe IV. Given two ſelling prices and the rate per cent. of one of them, in order to find the rate per cent. of the other ſelling price.

Rule. As the price, whoſe rate per cent. is given,
Is to 100, with the given rate added or ſubtracted,
So is the other given price,
To a fourth number;
From which number ſubtract 100, in caſe of gain; but which
Subtract from 100, in caſe of loſs.

11. By ſelling cheeſe at 5s. 9d. per ſtone, I gained 15l. per cent. what did I gain per cent. by ſelling it at 6s? Anſ. 20l.

12. A merchant ſelling wool at 8s. per ſtone gained 12l. per cent. what will he gain or loſe per cent. by ſelling the ſame wool at 7s. the ſtone? Anſ. loſt 2l. per cent.

VULGAR FRACTIONS.

A fraction is a part or parts of an unit, written thus, $\dfrac{5}{8}\begin{array}{l}\text{numerator,}\\ \text{denominator.}\end{array}$

The numerator is the remainder after diviſion, and the denominator the diviſor.

1. A proper fraction is when the numerator is leſs than the denominator, as $\frac{3}{4}$.

2. An improper fraction is when the numerator is equal to, or greater than the denominator, as $\frac{7}{6}$, $\frac{11}{2}$.

3. A ſimple fraction has but one numerator, and one denominator, as $\frac{3}{8}$.

4. A compound fraction is a fraction of a fraction, as $\frac{1}{2}$ of $\frac{3}{5}$.

5. A mixed number is compoſed of a whole number and a fraction, as $4\frac{1}{4}$.

Note. Any whole number may be expreſſed like a fraction, by writing 1 under it.

REDUCTION OF VULGAR FRACTIONS.

Problem 1. To reduce a fraction to its loweſt terms.

Rule. Find a common meaſure thus; divide the denominator by the numerator, and that diviſor by the remainder continually, till nothing remain: The laſt diviſor is the common meaſure: Then divide both the numerator and denominator by this meaſure:

Or, divide the numerator and denominator by any number which will divide them without a remainder.

Ex. 1. Reduce $\frac{46}{356}$ to its loweſt terms. Anſ. $\frac{23}{178}$.
2. Reduce $\frac{126}{1250}$ to its loweſt terms. Anſ. $\frac{63}{623}$.
3. Reduce $\frac{825}{2709}$ to its leaſt terms. Anſ. $\frac{275}{903}$.

Prob. 2. To reduce a mixed number to an improper fraction.

Rule. Multiply the whole number by the denominator, adding the numerator, under this ſum write the denominator.

Ex. 1. Reduce $5\frac{3}{4}$ to an improper fraction. Anſ. $\frac{23}{4}$.
2. Reduce $8\frac{16}{17}$ to an improper fraction. Anſ. $\frac{152}{17}$.

Prob. 3. To reduce an improper fraction to a whole or mixed number.

Rule. Divide the numerator by the denominator.

Ex. 1. Reduce $\frac{146}{4}$ to a whole or mixed number. Anſ. $36\frac{1}{2}$.

2. Reduce $\frac{1425}{24}$ to a whole or mixed number. Anſ. $59\frac{3}{8}$.

Prob. 4. To reduce a compound fraction to a ſimple one.

Rule. Multiply all the numerators together for the numerator, and all the denominators together for the denominator.

Ex. 1. Reduce $\frac{2}{3}$ of $\frac{3}{4}$ to a ſimple fraction. Anſ. $\frac{1}{2}$.

2. Reduce $\frac{11}{12}$ of $\frac{13}{14}$ of $\frac{16}{23}$ to a ſimple fraction. Anſ. $\frac{2288}{3864}$.

Prob. 5. To reduce fractions to a common denominator.

Rule. Multiply each numerator into all the denominators, except its own, for a new numerator; and multiply all the denominators together, for a common denominator.

Ex. 1. Reduce $\frac{2}{5}$ and $\frac{7}{8}$ to a common denominator. Anſ. $\frac{16}{40}$, $\frac{35}{40}$.

2. Reduce $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{5}{9}$ to a common denominator. Anſ. $\frac{36}{72}$, $\frac{54}{72}$, $\frac{40}{72}$.

3. Reduce $\frac{5}{8}$, $\frac{4}{9}$, $\frac{8}{15}$ and $\frac{11}{21}$ to a common denominator. Anſ. $\frac{14175}{22680}$, $\frac{10080}{22680}$, $\frac{12096}{22680}$, $\frac{11880}{22680}$.

4. Reduce $\frac{1}{2}$ of $\frac{3}{4}$, $\frac{4}{9}$, $4\frac{1}{2}$ and $\frac{5}{7}$ to a common denominator. Anſ. $\frac{378}{1008}$, $\frac{448}{1008}$, $\frac{4536}{1008}$, $\frac{720}{1008}$.

Prob. 6. To reduce a fraction from one denomination to another, which ſhall have the ſame value.

Rule. Find how many of the leſs denomination makes one of the greater; if from a higher to a lower, multiply the numerator by that number : or, the denominator, if to a greater.

Ex. 1. Reduce $\frac{5}{9}$ of a farthing to the fraction of a pound. Anſ. $\frac{1}{1728}$.

2. Reduce $\frac{2}{3}$ of a penny to the fraction of a pound. Anſ. $\frac{1}{360}$.

3. Reduce $\frac{5}{6}$ of a farthing to the fraction of a guinea. Anſ. $\frac{5}{6048}$.

4. Reduce $\frac{3}{4}$ of a crown to the fraction of a pound. Anſ. $\frac{3}{16}$.

5. Reduce $\frac{4}{5}$ of a farthing to the fraction of a ſhilling. Anſ. $\frac{1}{60}$.

6. Reduce $\frac{2}{7}$ of a pound to the fraction of a guinea. Anſ. $\frac{40}{147}$.

7. Reduce $\frac{1}{3}$ of half a crown to the fraction of a pound. Anſ. $\frac{1}{24}$.

8. Reduce $\frac{5}{6}$ lb. to the fraction of a ton. Anſ. $\frac{1}{2688}$.

9. Reduce $\frac{3}{5}$ dwt. to the fraction of a lb. Anſ. $\frac{1}{400}$.

10. Reduce $\frac{6}{7}$ oz. to the fraction of a cwt. Anſ. $\frac{3}{6272}$.

11. Reduce $\frac{6}{11}$ yd. to the fraction of a mile. Anſ. $\frac{3}{9680}$.

12. Reduce $\frac{1}{360}$l. to the fraction of a penny. Anſ. $\frac{2}{3}$.

13. Reduce $\frac{1}{4480}$ ton, to the fraction of a lb. Anſ. $\frac{1}{2}$.

Note. If the given number be of different denominations reduce it to the loweſt for a numerator, and reduce the denominator to the ſame name.

Ex. 1. Reduce 6s. 4d. to the fraction of a pound. Anſ. $\frac{19}{60}$.

2. Reduce $2\frac{1}{4}$d. to the fraction of a ſhilling. Anſ. $\frac{3}{16}$.

3. Reduce $8\frac{1}{2}$d. to the fraction of a crown. Anſ. $\frac{17}{120}$.

4 Reduce 2 roods, 15 poles, to the fraction of an acre. Anſ. $\frac{19}{32}$.

5. Reduce 3 cwt. 14 lb. to the fraction of a ton. Anſ. $\frac{35}{224}$.

6. Reduce $6\frac{3}{4}$ inches to the fraction of a foot. Anſ. $\frac{9}{16}$.

Prob. 7. To find the value of a fraction.

Rule. Multiply the numerator by the next lower denomination, and divide the product by the denominator. Reduce the remainder (if any) into the next lower denomination; and divide as before; and ſo on as far as is neceſſary.

Ex. 1 What is the value of $\frac{2}{3}$l? Anſ. 13s. 4d.

2. What is the value of $\frac{5}{8}$l? Anſ. 12s. 6d.

3. What is the value of $\frac{3}{4}$ of a guinea? Anſ. 15s. 9d.

4. What is the value of $\frac{4}{5}$ of half a crown? Anſ. 2s.

5. What is the value of $\frac{3}{7}$ lb. avoirdupois? Anſ. 6 oz. $13\frac{5}{7}$ dr.

6. What is the value of $\frac{4}{9}$ cwt.? Anſ. 1 qr. 21 lb. 12 oz. $7\frac{1}{9}$ dr.

7. What is the value of $\frac{3}{7}$ lb. troy? Anſ. 5 oz. 2 dwt. $20\frac{4}{7}$ gr.

8. Reduce $\frac{3}{8}$ of an ell Engliſh to its proper quantity. Anſ. 1 qr. $3\frac{1}{2}$ nls.

9. What is the proper quantity of $\frac{4}{5}$ of a mile? Anſ. 6 fur. 16 po.

10. What is the value of $\frac{5}{6}$ of a hogſhead of wine? Anſ. 52 gal. 2 qts.

11. What is the value of $\frac{3}{8}$ of an acre? Anſ. 1 rood, 20 po.

12. What is the value of $\frac{5}{6}$ of a boll of corn Scots meaſure? Anſ. 3 fir. 1 pk. $1\frac{1}{3}$ lippy.

13. What is the proper quantity of $\frac{3}{5}$ of a day? Anſ. 14 ho. 24 min.

ADDITION OF VULGAR FRACTIONS.

RULE.

Reduce compound fractions to ſimple ones; mixed numbers to improper fractions; fractions of different denominations to thoſe of the ſame; and all of them to a common denominator; then add the numerators together, and under their ſum, place the common denominator.

Ex. 1. Add $\frac{2}{5}$ and $\frac{3}{4}$ together. Anſ. $1\frac{3}{20}$.

2. Add $\frac{3}{4}$, $\frac{2}{5}$ and $\frac{5}{6}$ together. Anſ. $1\frac{118}{120}$.

Note 1. When mixed numbers are given, find the ſum of the fractions, to which add the whole numbers.

3. What is the ſum of $5\frac{1}{2}$, $6\frac{7}{9}$, and $4\frac{3}{4}$? Anſ. $17\frac{1}{36}$.

2. When fractions are of different denominations, reduce them into the ſame; and add their numerators together; or find their value, and add as in compound addition.

4. Add $\frac{2}{3}$l. $\frac{3}{5}$s. and $\frac{5}{9}$ of a penny together? Anſ. 13s. $11\frac{3}{4}$d $\frac{1}{45}$.

5. Add $\frac{3}{8}$ of a guinea, to $\frac{3}{4}$ of a crown, $\frac{3}{7}$ of a ſhilling, and $\frac{4}{9}$ of a penny. Anſ. 12s. $1\frac{0}{4}$d $\frac{22}{63}$.

6. What is the ſum of $\frac{3}{4}$ of a foot, $\frac{2}{3}$ of a yard, and $\frac{7}{8}$ of a mile? Anſ. 1540 yds. 2 f. 9 in.

7. Required the ſum of $5\frac{1}{2}$ yards, $4\frac{3}{5}$ Engliſh ells, and $\frac{2}{5}$ of a nail. Anſ. 11 yds. 1 qr. $0\frac{2}{5}$ nl.

8. What is the ſum of $\frac{5}{12}$ of a ton, and $\frac{9}{11}$ of a cwt.? Anſ. 9 cwt. 16 lb. 15 oz. $\frac{17}{33}$.

9. Add $\frac{1}{3}$ of a day, and $\frac{5}{24}$ of an hour together. Anſ. 8 ho. 12 min. 30 ſec.

SUBTRACTION OF VULGAR FRACTIONS.

RULE.

Prepare the fractions as in addition; then, take the difference of the numerators, and place it over the common denominator.

Ex. 1. What is the difference of $\frac{3}{4}$ and $\frac{5}{9}$? Anſ. $\frac{7}{36}$.

2. What is the difference of $\frac{4}{5}$ and $\frac{9}{20}$? Anſ. $\frac{7}{20}$

3. From $\frac{2}{5}$ of 9, take $1\frac{1}{9}$. Anſ. $2\frac{22}{45}$.

4. From $16\frac{1}{4}$ take $\frac{2}{3}$ of 18. Anſ. $4\frac{1}{4}$.

5. From $\frac{3}{4}$ of a pound, take $\frac{2}{5}$ of a ſhilling. Anſ. 14 s. $7\frac{0}{4}$d. $\frac{4}{5}$.

6. From $\frac{4}{7}$ of a guinea, take $\frac{1}{3}$ of a pound. Anſ. 5s. 4d.

7. From $\frac{4}{5}$ oz. take $\frac{3}{8}$ dwt. Anſ. 15 dwt. 15 grs.

8. From $3\frac{1}{2}$ cwt. take $15\frac{9}{10}$ lb. Anſ. 3 cwt. 1 qr. $12\frac{1}{10}$ lb.

MULTIPLICATION OF VULGAR FRACTIONS.

RULE.

Having prepared the fractions as in addition; then multiply all the numerators together for the numerator of the product, and all the denominators for the denominator.

Ex. 1. Multiply $\frac{3}{4}$ by $\frac{4}{7}$. Anſ. $\frac{3}{7}$.

2. Multiply $\frac{4}{9}$ by $\frac{3}{8}$. Anſ. $\frac{1}{6}$.

3. Multiply $\frac{3}{16}$ by $\frac{5}{18}$. Anſ. $\frac{5}{96}$.

4. Multiply $4\frac{7}{9}$ by $\frac{2}{3}$ of $\frac{3}{4}$. Anſ. $2\frac{7}{18}$.

5. Multiply $48\frac{1}{4}$ by 7. Anſ. $337\frac{3}{4}$.

6. Multiply $\frac{1}{2}$ of 9 by $\frac{3}{7}$. Anſ. $1\frac{13}{14}$.

7. Multiply $\frac{2}{5}$ of $\frac{3}{4}$ by $\frac{5}{9}$ of $2\frac{1}{7}$. Anſ. $\frac{45}{126}$.

8. What coſt $14\frac{1}{4}$ yards at 5s. 6d? Anſ. 3l. 18s. $4\frac{1}{2}$d.

DIVISION OF VULGAR FRACTIONS.

RULE.

Prepare the fractions as before; then invert the diviſor, and proceed exactly as in multiplication.

Ex. 1. Divide $\frac{4}{9}$ by $\frac{2}{3}$. Anſ. $\frac{2}{3}$.

2. Divide $\frac{3}{4}$ by $\frac{1}{2}$. Anſ. $1\frac{1}{2}$.

3. Divide $\frac{11}{12}$ by $\frac{5}{6}$. Anſ. $1\frac{1}{10}$.

4. Divide 18 by $\frac{3}{8}$. Anſ. 48.

5. Divide $14\frac{3}{4}$ by $\frac{241}{305}$. Anſ. $18\frac{643}{964}$.

6. Divide $456\frac{1}{7}$ by $3\frac{1}{2}$. Anſ. $130\frac{16}{49}$.

7. Divide $8\frac{3}{4}$ by $\frac{1}{3}$ of $\frac{9}{11}$. Anſ. $32\frac{1}{12}$.

8. Divide a prize of $2450\frac{1}{8}$l. into $40\frac{2}{5}$ ſhares. Anſ. 60l. 12s. 11d. $\frac{20}{101}$.

PROPORTION OF VULGAR FRACTIONS.

RULE.

State the terms as in whole numbers, and prepare them by the former rules; invert the firſt term of the proportion, then multiply as directed in multiplication.

Ex. 1. If $\frac{3}{4}$ yd. coſt $\frac{7}{9}$l. what coſt $5\frac{1}{4}$ yards? Anſ. 5l. 8s. $10\frac{1}{2}$d. $\frac{2}{3}$.

2. If $\frac{5}{6}$ of a gallon coſt $\frac{5}{8}$l. what will $\frac{5}{9}$ of a tun coſt? Anſ. 105l.

3. If $\frac{1}{8}$ of a ſhip coſt 445l. 15s. what is $\frac{7}{32}$ of her worth? Anſ. 780l. 1s. 3d.

4. If $\frac{3}{4}$ of a yard coſt $\frac{5}{8}$l. what is the price of $31\frac{1}{3}$ ells Flemiſh? Anſ. 19l. 11s. 8d.

5. If $1\frac{5}{7}$ lb. of gold is worth $61\frac{5}{7}$l. Sterling, what is 2 grs. worth? Anſ. 3d.

DECIMAL FRACTIONS

Are ſuch as have an unit for their denominator, with as many ciphers annexed, as there are figures in the numerator; as $\frac{2}{10}$, $\frac{34}{100}$, $\frac{564}{1000}$, uſually written with a point perfixed, without the denominator .2, .34, .564, and read thus; .2 two tenths; .34 thirty four hundredth parts; .564 five hundred and ſixty four thouſand parts; and ſo on.

Note. Ciphers, on the right hand of decimals, do not alter their value.

REDUCTION OF DECIMALS.

Prob. 1. To reduce a vulgar fraction to a decimal.

Rule. Annex ciphers to the numerator, and divide by the denominator.

Ex. 1. What is the decimal of $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$? Anſ. .25 .5 .75.

4. What is the decimal of $\frac{1}{8}$? Anſ. .125.
5. What is the decimal of $\frac{5}{8}$? Anſ. .625.
6. Reduce $\frac{3}{5}$ to a decimal. Anſ. .6.
7. Reduce $\frac{7}{12}$ to a decimal. Anſ. .583, *&c.*
8. Reduce $\frac{15}{44}$ to a decimal. Anſ. .3409, *&c.*
9. What is the decimal of $\frac{124}{1264}$. Anſ. .0981. *&c.*

Note. If there are not as many figures in the quotient, as ciphers annexed; ſupply the defect, by writing ciphers on the left hand.

Prob. 2. If the given number conſiſts of ſeveral denominations.

Rule. Reduce it to the loweſt denomination for a numerator, and reduce the denominator to the ſame; then annex ciphers and divide as before. Or:

When there are ſeveral denominations begin at the loweſt, and reduce them in their order.

Ex. 1. Reduce 15s. 6$\frac{3}{4}$d. to the decimal of a pound. Anſ. .778125l.

2. Reduce 9d. to the decimal of a pound. Anſ. .0375l.

3. Reduce 8s. 6d. to the decimal of a pound. Anſ. .425l.

4. Reduce 12s. 8$\frac{1}{2}$d. to the decimal of a guinea. Anſ. .605158g. *&c.*

5. Reduce 6$\frac{1}{2}$d. to the decimal of a ſhilling. Anſ. .5416, &c.

6. Reduce 8 oz. 12 dwt. 16 grs. to the decimal of a lb. troy. Anſ. .719444 $^{\underline{256}}$

7. Reduce 2 qrs. 16 lb. to the decimal of a cwt. Anſ. .642857 $^{\underline{16}}$

8. Reduce 20 yds. 2 f. 6 in. to the decimal of a mile. Anſ. .0118371 ^{1344}

9. Reduce 2 qrs. 2 nls. to the decimal of a yard. Anſ. .625

10. Reduce 1 rood, 20 po. to the decimal of an acre. Anſ. .375

11. Reduce 3 buſh. 1 pk. to the decimal of a quarter. Anſ. .40625

12. Reduce 15 gallons of wine to the decimal of a tun. Anſ. .0595238 $\underline{24}$

13. Reduce $6\frac{3}{4}$ inches to the decimal of a foot. Anſ. .5625

14. Reduce 2 firlots, 3 pks. 1 lippy, to the decimal of a boll. Anſ. .703125

Prob. 3. To find the value of a decimal.

Rule. Multiply it by the value of the given denomination, and point off as many decimals from the right hand of the product as there are places in the given decimal. The figures on the left hand are integers of the next lower denomination; reduce the figures pointed off into the next lower denomination; proceed in this manner till you come to the loweſt.

Ex. 1. What is the value of .85 of a L.? Anſ 17s.

2. What is the value of .1875l.? Anſ. 3s. 9d.

3. What is the value of .125s.? Anſ. $1\frac{1}{2}$d.

4. What is the value of .6845 cwt.? Anſ. 2 qrs. 20 lb. 10 oz. 9 dr. $\underline{9840}$

5. What is the value of .121 of a tun of wine? Anſ. 30 gal. 3 pts. $\underline{936}$

6. What is the value of .03125 of a barrel of beer? Anſ. 1 gal. 1 pt.

7. What is the value of .28 of a mile? Anſ. 2 fur. 9 po. 3 yds. 10 in. 2 b. c.

Prob. 4. To find the decimal of Sterling money by inſpection.

Rule. Take half the even number of ſhillings for the firſt decimal figure; and the number of farthings in the remainder, increaſed by 1 if they amount to 24 or upwards; by 2 if they amount to 48, or upwards; and by 3, if they amount to 72, or upwards, for the ſecond and third figures; if there be but one figure, prefix a cipher to it.

To complete the decimal, call theſe two figures, or their exceſs above 25, 50, or 75, pence; the farthings in them increaſed by 1 for every 24, give other two figures; continue this method till the decimal end or repeat.

Ex. 1. Reduce 6s. $4\frac{1}{2}$d. to a decimal. Anſ. .31875.
2. Reduce 9s. $6\frac{3}{4}$d. to a decimal. Anſ. .478125.
3. Find by inſpection the decimal of 10s. $8\frac{1}{4}$d, Anſ. .534375.

Prob. 5. To value the decimal of a pound Sterling by inſpection.

Rule. Double the figure next the point, for ſhillings; if the next figure be 5, or upwards, take 5 from it and add one to the ſhillings; then the ſecond and third figures are farthings, after deducting 1 for every 25 in them.

Ex. 1. Value .318l. Anſ. 6s. $4\frac{1}{2}$d.
2. .478l. Anſ. 9s. $6\frac{3}{4}$d.
3. .534l. Anſ. 10s. $8\frac{1}{4}$d.

ADDITION AND SUBTRACTION OF DECIMALS.

RULE.

Write down the given numbers, placing the decimal points directly under each other; then proceed as in whole numbers.

Ex. 1. What is the ſum of 2 .64, 85 .6, .945, 14 .8, 5 .3456 and 84? Anſ. 193 .3306

2. What is the ſum of 785 .1, 84 .35, 1 .654, .8956, .009 and 10 .161? Anſ. 882 .1696

3. What is the difference between .8406 and .58975? Anſ. .25085

4. What is the difference of 84 .95 and 3 .6954? Anſ. 81 .2546

5. What is the difference of 246, and .8154? Anſ. 245 .1846

6. L borrowed from M 20 .78125l. and afterwards paid him 14l. 18s. 9d. what remains due to M? Anſ. 5l. 16s. 10½d.

7. Find the difference between 40 yds. 2 qrs. and 29 .625 yds. Anſ. 10 yds. 3 qrs. 2 nls.

MULTIPLICATION OF DECIMALS.

RULE.

1. Place the factors, and multiply as in whole numbers.

2. Point off as many decimal places in the product, towards the right hand, as there are in both factors; and if the product has not ſo many, ſupply the defect by writing ciphers on the left hand.

Ex. 1. Multiply 346 .549 by 3 .15. Anſ. 1091 .62935.

2. Multiply 516.8945 by 44 .89. Anſ. 23203.394105.

3. Multiply .84615 by .065. Anſ. .05499975.

4. Multiply .346809 by .00546. Anſ. .00189357714.

5. A Gentleman has .83125l. a day, how much is that in a year? Anſ. 303l. 8s. 1½d.

RULE.

Divide as in whole numbers, and point off as many decimal places in the quotient as the dividend has more than the diviſor.

Note 1. If there are not as many decimal places in the quotient as required, ſupply the defect by writing ciphers on the left hand.

2. If there be a remainder, the quotient may be carried to any degree of exactneſs, by annexing ciphers: or, if the decimal places in the diviſor be more than thoſe in the dividend; ciphers may be annexed to the dividend.

3. If the dividend will not contain the diviſor, you muſt annex ciphers thereto.

Ex. 1. Divide 45.3496 by 3.68. Anſ. $12.32^{\underline{120}}$
2. Divide 24.694 by .45. Anſ. $54.8.^{\underline{34}}$
3. Divide 8496 by .546. Anſ. $15560^{\underline{240}}$
4. Divide .21468 by 2.5. Anſ. $.0858^{\underline{18}}$
5. Divide .80468 by .075. Anſ. $10.72^{\underline{68}}$
6. Divide 8.4567 by .215. Anſ. $.3382^{\underline{17}}$
7. Divide 06548 by 215. Anſ. $00040^{\underline{98}}$
8. Divide 216.4 by 100. Anſ. $2.1^{\underline{64}}$
9. A merchant bought a cwt. of ſugar for 3.85l. and intends to gain 1½d. on each lb. at what rate muſt he retail it per lb? Anſ. 9¾d.

PROPORTION IN DECIMALS.

Ex. 1. If 1¼ yd. of cloth coſt 12s. 6d. what coſt 30 yards? Anſ. 15l.

2. If the clothing of 850 ſoldiers come to 3000l. 10s. how much is that for each man? Anſ. 3.53l. 3l. 10s. 7d.

3. If 1 ſtone of cheeſe coſt 6s. 7½d. what coſt 50½ ſtones? Anſ. 16l. 14s. 6¾d.

4. If ¼ of a pound of ſilk coſt 8s. 6d. what will 20½ pounds coſt? Anſ. 34.851.

EXTRACTION OF THE SQUARE ROOT.

RULE.

1. Divide the given number into periods of two figures each, beginning at the right hand; and pointing towards the left in integers, and towards the right in decimals. Every period will give one figure in the root.

2. Find the greateſt ſquare number contained in the left hand period, place its root in the quotient, ſubtract its ſquare from the firſt period, and to the remainder bring down the ſecond period for a dividend.

3. Write the double of the part of the root, found on the left hand of the dividend, divide by it omitting the units place; ſet the reſult in the quotient, and annex it alſo to the diviſor.

4. Multiply the diviſor thus completed by the laſt figure placed in the root. Subtract the product from the dividend, and to the remainder bring down the next period for a new dividend; proceed in the ſame manner till all the periods are brought down.

Note 1. The root conſiſts of as many whole numbers and decimals, as there are periods belonging to each.

2. If there is a remainder after all the periods are uſed, the operation may be continued at pleaſure by annexing periods of ciphers.

3. Roots of vulgar fractions, are found by extracting the root of the numerator for a new numerator, and the

root of the denominator, for a new denominator: but, if that cannot be done exactly, reduce the vulgar fraction to a decimal, and proceed as above.

Ex. 1. Required the ſquare root of 144. Anſ. 12

2. What is the ſquare root of 1728? Anſ. $41.5^{\underline{575}}$

3. What is the ſquare root of 40804? Anſ. 202

4. What is the root of .2916? Anſ. .54

5. What is the root of 42.1685? Anſ. $6.49^{\underline{484}}$

6. What is the root of $\frac{289}{576}$? Anſ. $\frac{17}{24}$.

7. In a ſquare plantation, containing 505995 trees, the trees are planted 6 feet diſtant; what is the length of the ſide? Anſ. 4268 feet nearly.

8. A gentleman has two fields, the firſt contains 8 acres, 2 ro. 1 pole, the ſecond 6 ac. 2 ro. he wiſhes to exchange them for a ſquare field; required the ſide of the ſquare? Anſ. 49 poles.

9. A gentleman has two circular ponds in his pleaſure ground; the diameter of the one is 200 feet, and the other three times as large; what is its diameter? Anſ. $346.4^{\underline{704}}$

Given any two ſides of a right angled triangle, to find the other ſide.

The ſquare of the hypothenuſe, or longeſt ſide, is equal to the ſum of the ſquares of the other two ſides; therefore the difference, of the ſquares of the hypothenuſe, and either of the other ſides, is the ſquare of the remaining ſide.

10. A wall is 48 feet high, and a ditch before it is 36 feet wide; required the length of a ladder, that will reach from the oppoſite ſide of the ditch, to the top of the wall? Anſ. 60 feet.

RULE.

1. Divide the given number into periods of three figures each, beginning at the right hand in integers, and pointing toward the left. But in decimals, begin at the place of thouſands, and point toward the right.

2. Find the greateſt cube number, in the left hand period, and place the root of that number, as the firſt figure of the root ſought; ſubtract the number itſelf from ſaid period, and to the remainder bring down the next period for a dividend.

3. Find a diviſor, by multiplying the ſquare of the part of the root found by 300, divide the dividend by it; and put the quotient figure for the next figure of the root.

4. Multiply the part of the root formerly found by the laſt figure placed in it, and this product by 30; place this laſt product under the diviſor; and under this product, write the ſquare of the figure laſt placed in the root.

5. Multiply the ſum of theſe three by the figure laſt placed in the root, and ſubtract the product from the dividend.

6. To the remainder bring down the next period for a new dividend, with which proceed as before.

Required the Cube Roots of the following numbers?

1.	1728	Anſ.	12
2.	48228544	Anſ.	364
3.	40107047967	Anſ.	3423
4.	14706.125	Anſ.	24.5
5.	$\frac{13824}{42875}$	Anſ.	$\frac{24}{35}$

Rules for working on the Carpenters Sliding Rule, and on Gunters Scale.

Note. The Rules are commonly marked with A in the Rule, B and C on the ſlider, and D on the girt, or ſquare line.

To multiply by the ſliding rule.

Rule. Set 1 on B, to one of the factors on A, then againſt the other factor on B, you have the product on A.

By Gunters Scale.

Rule. Extend the compaſſes from the beginning of the line of numbers, to one of the factors; the ſame diſtance ſhall reach from the other factor to the product.

To divide by the Sliding Rule.

Rule. Set the diviſor on B, to the dividend on A; then againſt 1 on B, you have the quotient on A.

By Gunters Scale.

Rule. Extend the compaſſes from the dividend to the diviſor; the ſame diſtance ſhall reach from 1 to the quotient.

Proportion by the Sliding Rule.

Rule. Set the firſt number on B, to the ſecond on A, then againſt the third number on B, is the anſwer on A.

By Gunters Scale.

Rule. Extend the compaſſes from the firſt number to the ſecond, that extent will reach in the ſame direction, from the third number, to the fourth.

Superficial meaſure by the Sliding Rule.

Rule. Set the breadth in inches on B to 12 on A; then againſt the length in feet on A, is the content on B, in ſquare feet, *&c.*

By Gunters Scale.

Rule. Extend the compaſſes from 12 to the breadth; that extent, ſet the ſame way, will reach from the length to the content.

Solid meaſure by the Sliding Rule.

Rule. Set the length in feet on C, to 12 on D or girt line, then againſt the ſide of the ſquare on D, you have the anſwer on C.

By Gunters Scale.

Rule. Extend the compaſſes from 12 to the ſide of the ſquare; that extent twice ſet will reach from the length to the anſwer.

To extract the Square Root by the Sliding Rule.

Rule. Set 1 or 100 on C, to 1 or 10 on the girt line, or D; then againſt the given number on C, you have the root on D.

To find a mean ſquare by the Sliding Rule.

Rule. Multiply the breadth and depth together, and extract the ſquare root of the product; the root is the mean ſquare.

OR,

Set the breadth in inches on C, to ditto on D; then againſt the depth or thickneſs in inches on C, you have the mean ſquare in inches on D, or girt line.

By Gunters Scale.

Rule. The middle point, between the breadth and depth, is the mean ſquare.

DUODECIMALS, OR CROSS MULTIPLICATION,

Is a rule by which artificers and workmen caſt up the contents of their work.

RULE.

1. Write the multiplier under the multiplicand, feet under feet, inches under inches, ſeconds under ſeconds, &c.

2. Multiply each denomination of the length, by the feet of the breadth, beginning at the loweſt, and place each product under that denomination of the multiplicand from which it ariſes, always carrying one for every 12.

3. Multiply by the inches, and ſet each product one place farther to the right hand.

4. Multiply by the ſeconds or parts, and ſet each product another place towards the right hand.

5. Proceed in this manner with all the reſt of the denominations, and their ſum will be the anſwer.

Note. Feet multiplied by feet give feet.
Feet multiplied by inches give inches.
Feet multiplied by ſeconds give ſeconds.
Inches multiplied by inches give ſeconds.
Inches multiplied by ſeconds give thirds.
Seconds multiplied by ſeconds give fourths, &c.

12 Fourths = 1 Third,
12 Thirds = 1 Second, or part,
12 Seconds = 1 Inch,
12 Inches = 1 Foot.

Ex. 1. Multiply 6 feet, 3 inches, by 3 feet, 2 inches. Anſ. 19 feet, 9 in. 6 p.

2. Multiply 4 feet, 5 in. by 3 feet 6 in. Anſ. 13 f. 5 in. 6 p.

3. Multiply 5 feet, 6 in. by 4 feet, 3 in. Anſ. 23 f. 4 in. 6 p.

4. Multiply 6 feet, 6 in. by 3 feet 8 in. Anſ. 23 f. 10 in.

5. Multiply 24 feet, 3 in. by 16 feet 7 in. Anſ. 402 f. 1 in.

6. Multiply 48 feet, 7 in. by 36 feet 6 in. Anſ. 1773 f. 3 in. 6 pa.

7. Multiply 6 feet, 4 in. 3 pa. by 4 feet, 3 in. 6 pa. Anſ. 27 f. 3 in. 2 pa. 10 th. 6 fourths.

8. Multiply 56 feet, 1 in. 4 pa. by 48 feet, 3 in. 6 pa. Anſ. 2709 f. 8 in. 4 s. 8 th.

9. Multiply 68 feet, 8 in. by 9 feet, 10 in. 11 pa. Anſ. 680 f. 5 in. 7 s. 4 th.

Menſuration is of three kinds; lineal, ſuperficial, and ſolid. Lineal meaſure reſpects length only. Superficial includes length and breadth. Solid meaſure comprehends length, breadth, and thickneſs.

Problem 1. To find the ſuperficial content of board or plank.

RULE.

Multiply the length by the breadth.

10. In a board 12 feet long, and 8 inches broad, how many ſquare feet? Anſ. 8 feet.

11. Required the area of a plank 14 in. broad, and 16 feet, 6 in. long? Anſ. 19 feet 3 in.

12. In a deal 15 feet 6 in. long, and 10 in. 6 parts broad, how many ſquare feet? Anſ. 13 f. 6 in. 9 pa.

13. Required the content of a plank $20\frac{3}{4}$ feet long, and $12\frac{1}{2}$ in. broad? Anſ. 21 f. 7 in. 4 s. 6 th.

14. In a deal $10\frac{1}{3}$ feet long, and $8\frac{1}{4}$ inches broad, how many ſquare feet? Anſ. 7 f. 1 in. 3 p.

Note. If the two ends of a plank or board differ in breadth; add the two breadths, and multiply the length by half the ſum.

15. How many ſquare feet in a board 12 feet 9 inches long, the breadth at one end is 15 inches, and at the other 10? Anſ. 13 f. 3 in. 4 p. 6 th.

Problem 2.

To find the ſolid content of ſquare, or unequal-ſided timber or ſtone.

RULE.

Multiply the length, breadth, and thickneſs together.

15. Required the ſolid content of a tree 16 feet long and 14 inches the ſide of the ſquare? Anſ. 21 f. 9 in. 4 p.

16. Required the ſolid content of a tree 14 feet long and $10\frac{1}{2}$ inches the ſide of the ſquare? Anſ. 10 f. 8 in. 7 s. 6 th.

17. What is the ſolid content of a tree 24 feet 6 in. long, and 20 in. the ſide of the ſquare? Anſ. 68 f. 8 p.

18. If a piece of timber be $18\frac{1}{2}$ feet long, 14 inches broad and 9 deep, what is the ſolid content thereof? Anſ. 16 f. 2 in. 3 p.

19. What is the ſolid content of a piece of timber or ſtone whoſe ſides are 10 in. by 18, and the length 18 feet? Anſ. 22 f. 6 in.

20. What is the ſolid content of a piece of timber 15 feet 3 in. in length, breadth 15 in. and depth $4\frac{1}{2}$ in.? Anſ. 7 f. 1 in. 9 p. 4 th. 6 fs.

21. How much timber are there in a tree 2 feet 6 in. by 1 foot 10 in. and $38\frac{1}{4}$ feet long? Anſ. 177 f. 7 in. 3 p.

Note. The uſual way to meaſure round timber, is to girt the tree in the middle with a ſmall cord, then $\frac{1}{4}$ of the girt is conſidered as the ſide of the ſquare.

Tapering timber is meaſured by girding it in two or more places, and dividing the ſum of the girts by their number for the mean girt.

22. What is the ſolid content of a round tree 25 feet long, and girt in the middle 45 inches? Anſ. 21 f. 11 in. 8 s. 9 fourths.

23. How much timber in a round tree 30 feet long, and the girt 42 inches? Anſ. 22 f. 11 in. 7 p. 6 th.

24. How many ſolid feet in a round tree 28 feet 6 in. long, and the girts 48 in. 42 in. and 36 in. Anſ. 21 f. 9 in. 10 s. 1 th. 6 fo.

BOARD OR SUPERFICIAL MEASURE.

Length in feet.	Breadth in inches.	Content in ſq. feet.	Length in feet.	Breadth in inches.	Content in ſq. feet.
					feet in.
25. 14	18	21	31. $18\frac{1}{2}$	14	21 7
26. 9	$17\frac{1}{2}$	$13\frac{1}{8}$	32. $24\frac{3}{4}$	$21\frac{1}{4}$	43 9 11
27. $11\frac{1}{4}$	$7\frac{3}{4}$	$7\frac{1}{4}$, &c.	33. $12\frac{1}{4}$	9	9 2, &c.
28. $9\frac{3}{4}$	$13\frac{1}{4}$	$10\frac{3}{4}$, &c.	34. 30	22	55
29. $8\frac{1}{4}$	22	$15\frac{1}{8}$			
30. $14\frac{1}{2}$	20	$24\frac{1}{6}$			

EQUAL SIDED TIMBER, OR ROUND.

	Length in feet.	ſide ſq. in inches.	ſolid content. in feet.	in p.
35.	18	15	28	1 6
36.	14	16	24	10 8
37.	16¼	9½	10	2, &c.
38.	18	8	8	
39.	12	15	18¾	
40.	22	8½	11, &c.	
41.	27½	19	68	11, &c.
42.	6¾	22¼	23	2, &c.
43.	24½	30¾	160	10, &c.
44.	34	6½	9	11, &c.
45.	9	14	12	3
46.	4	16	7	1 4
47.	13	17	26	1 1
48.	15½	18½	36	10, &c.
49.	17	13	19	11, &c.
50.	19½	28	106	2
51.	24	32¼	173	4 1
52.	29¼	31	195	2, &c.
53.	40¾	19	102	1 10 9

UNEQUAL SIDED TIMBER, OR STONE.

	Breadth in inches.	Depth or thickneſs in inches.	Length in feet.	Content in ſolid feet, &c.
54.	32	18	14½	58
55.	13	10	18	16¼
56.	8½	7½	14	6 2
57.	14	11½	9	10, &c.
58.	19	8¾	24	27 8 6
59.	15½	3¼	16	5 7 2
60.	11	9	16	11
61.	17	11	41	53 3
62.	30	19	18¾	74 2

63. In a piece of tapering unequal-ſided timber, 24 feet 9 inches long, the baſe at the greater end being 34 inches by 20, and at the other end 17 inches by 10; how many ſolid feet? Anſ. 62 f. 7 in. 9 p. 4 th. 6 fo.

Note. Add the length and breadth of the baſes ſeparately; divide each of their ſums by 2, then multiply the quotients together and that product by the length.

64. How many ſquare feet, in the floor, roof, and walls of a houſe 50 feet long, 18 feet broad, and 15 high? Anſ. 3840 feet.

65. What is the weight of a plank $24\frac{1}{4}$ feet long, 2 broad, and $1\frac{1}{4}$ thick, at 25 lb. the ſolid foot? Anſ. $1531\frac{1}{4}$ lb.

66. Required the price of the ſame, viz. $61\frac{1}{4}$ feet, at 1s. 2d. per foot, and the expence of carrying it at $\frac{1}{2}$d. per lb.? Anſ. price 3l. 11s. $5\frac{1}{2}$d. carriage 3l. 3s. $9\frac{1}{2}$d. $\frac{1}{2}$.

67. How many ſquare feet of paving in a court yard, 68 feet, 4 inches, by 60 feet 6 in. and what will it coſt at $3\frac{1}{4}$d. the ſquare yard? Anſ. 4134 feet, 2 in. coſt 6l. 4s. $4\frac{3}{4}$d. $\frac{31}{34}$.

68. A houſe with 3 rows of windows, 5 in a row, the height of the firſt is 5 feet 6 in. the ſecond 5 feet 3 in. and the third 4 feet 9 in. the breadth of each is 2 feet 6 inches; required the number of feet, and the expence of glazing at $9\frac{1}{2}$d. per ſquare foot? Anſ. 193 f. 9 in. expence, 7l. 13s. $4\frac{1}{2}$d. $\frac{1}{2}$.

69. How many ſquare yards of flooring are in a houſe of 4 floors, the ground one included, 60 feet, by 30 within the walls, deducting from each floor the vacancy for the ſtair 12 feet 4 inches by 8 feet 6 in. required alſo the value at 3s 6d the ſquare yd.? Anſ. 753 yds. 3 f. 8 in. Value, 131l. 16s. $11\frac{1}{9}$d.

70. How many ſquare yards of painting in a room 40 feet 6 inches long, 24 feet 3 in. broad, and 10 feet 6 in. high; and how much does it come to at 7½d. the yd.? Anſ. 151 yds 9 in. comes to 4l. 14s. 5¾d. ½.

71. How many yards of plaſtering in the roof and walls of a room 32 feet 6 in. long, 16 feet 6 in. broad, and 9 feet 3 in. high, deducting a door 6 feet 6 in. by 3 feet, and what will it come to at 4½d the ſquare yd.? Anſ. 158 yds. 1 foot 3 in. coſt 2l. 19s. 3½d. ½.

72. A log of wood, 12 feet 6 inches long, was ſawed into 9 deals, each 1 foot 9 inches broad; how many ſuperficial feet did they contain, and what is the ſawer's wages at ½d per ſquare foot? Anſ. 196 feet 10 in. 6 pa. and ſawer's wages 8s. 2¼d. ¼. rem.

73. How many deals 12 feet 6 in. long, and 8½ in. broad, will floor a room 50 feet by 16? Anſ. 90 $\frac{6}{17}$.

74. How many roods of maſon work in a wall 50½ feet long and 24¼ feet high; and what will it coſt at 40s. the rood? Anſ. 3 ro. 28 yds. 7½ in. coſt 7l. 11s. 2¼d. $\frac{1}{27}$

Note. Two feet thick is generally accounted the ſtandard for ſtone walls, and three half bricks reckoned the ſtandard for brick walls, and walls of any other thickneſs muſt be reduced to the above ſtandards.

75. What is the expence of a wall 64 feet long and 20 feet high and three feet thick, at 40s. per rood? Anſ. 11l. 17s. 0¼d. 252.

76. How many ſquare yards of brick work in a wall 48 feet long, 28 feet high, and 2½ bricks thick? Anſ. 248 yds. 8 feet.

77. A houſe 41 feet long, 20 feet 9 inches wide, and 18 feet 9 inches high; the gables above the ſide walls 8 feet 6 inches; the gables are 2½ feet thick; the two chimney ſtalks 4 feet wide, 2½ feet thick, and 5 feet 1 inch high.

The broached hewn work of ſaid houſe is, four ſkews, each 11 feet 6 inches, by 1 foot 7 inches. Four corners, each 18 feet 9 inches, by 2 feet 6 inches. Two chimney ſtalks, the girt of each 13 feet, and the height 5 feet 3 inches.

THE DROVED HEWN WORK.

The rybats and lintels of 6 windows each 13 feet 11 inches, by 1 foot 3 inches; ſix ſoles of ditto, each 3 feet 11 inches, by 1 foot 7 inches; one window, the rybats and lintel 9 feet three inches, by 1 f. 3 in. ſole of ditto 3 f. 3 in. by 1 f. 7 in. The rybats and lintel of a door 19 f. 3 in. by 1 foot 3 in.; the ſole of ditto 4 f. 3 in. by 1 f. 7 in. Three pair of jambs each 6 f. by 2 f. the lintels of ditto each 4 f. 5 in. by 1 f. 3 in. Three inner hearths, each 3 f. 1 in. by 1 f. 6 in. Three outer hearths, each 3 f. 8 in. by 1 f. 8 in. Kitchen jambs 8 f. 8 in. by 2 f. 3 in. lintel of ditto 5 f. 8 in. by 1 f. 3 in. hearth 4 f. by 1 f. 9 in. likewiſe 106½ f. of vents.

How many roods of building are in ſaid houſe? and how many feet of hewn work? Alſo, what are the expences for workmanſhip, the building being at 1l. 10s. per rood; the broached hewn work at 4d, and the droved hewn work at 5d. per foot, and the vents at 6d. per lineal foot? Anſ. 29l. 4s. 1d. &c.

Note. One foot is added to the height of the ſide walls, as an allowance for levelling.

78 How many roods in a ſlated roof, the length of the ridge being 41 f. 9 in.; and girt from eave to eave, 46 f. 6 in., allowing 9 in. additional on each ſide for the eaves; and what will the expence of ſlating come to at 14s. 6d. the rood? Anſ 6. ro. 6s. yds. 6s. feet. Expence 4l. 9s. $8\frac{2}{9}$d.

THE GREGORIAN CALLENDAR.

Prob. 1 To find when leap year happens.

Rule. Divide the given year by 4 if nothing remains it is leap year.

Prob. 2. To find the golden number.

Rule. Add 1 to the given year, and divide by 19, the remainder is the golden number.

Prob. 3. To find the epact.

Rule. Take 1 from the golden number, multiply the remainder by 11, and divide the product by 30, the remainder is the epact.

Prob. 4. To find the moon's age.

Rule. Add together the epact of the year, the epact of the month, and the day of the month; the ſum ſubtracting 30, if above it, is the moon's age nearly.

Note. The day of mean new moon being known, add $7\frac{1}{2}$ days to it for the meantime of the firſt quarter: 15 days for the meantime of full moon; and $22\frac{1}{2}$ days for the third quarter.

Note. The epact, or number for each month.

In common years.

Jan.	Feb.	Mar.	Ap.	May	June	July	Aug.
0	2	0	2	2	4	4	6
Sep.	**Oct.**	**Nov.**	**Dec.**				
7	8	10	10				

In leap years.

Jan.	Feb.	Mar.	Ap.	May	June	July
0.	2.	1.	3.	3.	5.	5.
Aug.	**Sep.**	**Oct.**	**Nov.**	**Dec.**		
7.	8.	9.	10.	11.		

Prob. 5. To find the time of the moon's ſouthing.

Rule. Multiply the moon's age by 4, divide the product by 5, the quotient is hours, and the remainder multiplied by 12 give minutes.

TABLE.

Moon's age		Southing.	
		hours	min.
1	16	0	48
2	17	1	36
3	18	2	24
4	19	3	12
5	20	4	
6	21	4	48
7	22	5	36
8	23	6	24
9	24	7	12
10	25	8	
11	26	8	48
12	27	9	36
13	28	10	24
14	29	11	12
15	30	12	

Note. The moon's ſouthing from new moon to her full is afternoon; but from her full to the change is before noon.

Prob. 6. To find the Cycle of the ſun, the Roman Indiction, and the Julian period.

Rule. To the given year add 9 for the Cycle of the ſun, and divide by 28; add 3 for the Indiction, and divide by 15; and add 4713 for the Julian period.

Prob. 7. To find the Dominical, or Sunday letter.

Rule. To the given year, add its fourth part, omitting remainders, divide that ſum by 7; if 0 remain, G is the dominical letter; but, if there be a remainder, ſubtract it from 7 (till the year 1799 incluſive) and from 8 for the 18th century: what remains is the number of the letter; in common years, reckoning A 1, B 2, C 3, D 4, E 5, F 6, G 7; but in leap years, this letter and its preceding one are the dominical letters; the preceding one takes place, from the 1ſt January to the end of February. The dominical letter goeth backward in a common year one letter; but in a leap year two.

A TABLE

Of the Golden numbers, Epacts, and Dominical letters for the 18th century.

Years.	G.	E.	D. L.	Years.	G.	E.	D. L.
1801	16	15	D	1815	11	20	A
2	17	26	C	16	12	1	G F
3	18	7	B	17	13	12	E
4	19	18	A G	18	14	23	D
5	1	0	F	19	15	4	C
6	2	11	E	20	16	15	B A
7	3	22	D	21	17	26	G
8	4	3	C B	22	18	7	F
9	5	14	A	23	19	18	E
10	6	25	G	24	1	0	D C
11	7	6	F	25	2	11	B
12	8	17	E D	26	3	22	A
13	9	28	C	27	4	3	G
14	10	9	B	28	5	14	F E

Note. When the ſolar and lunar years begin together, the epact for the year is 0 or 29.

Ex. 1. Required the golden number, and Epact, for the year 1798? Anſ. 13 G. N. 12 Epact.

2. Required the moon's age, and the time of her ſouthing, June 5. 1797? Anſ. 10 moon's age, 8 morning her ſouthing.

3. Required the Cycle of the ſun, the Roman Indiction, the Julian Period, and the Dominical letter, for the year 1798? Anſ. 15 Cycle. 1 Indiction. 6511 J. P. G. Dominical letter.

n Almanac, containing the Dominical letters, and the Sunday figures.

Jan. Oct.	A	B	C	D	E	F	G
May	B	C	D	E	F	G	A
Auguſt	C	D	E	F	G	A	B
eb. March Nov.	D	E	F	G	A	B	C
June	E	F	G	A	B	C	D
Sep. Dec.	F	G	A	B	C	D	E
April July	G	A	B	C	D	E	F
	1	2	3	4	5	67	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

an. Feb. March April May June
At Dover Dwells George Brown Eſquire,
July Auguſt Sep. Oct. Nov. Dec.
ood Charles Finch And David Friar.

Note. January begins with A. February with D. and on.

o find the day of the week for any day of the month given.

First, ſind the dominical letter for the year wanted.

Ex. 1. On what day of the week will the 25th day of ecember happen in the year 1797? Anſ. the ſecond. he dominical letter for 1797, is A. look in the almanac for December, then in a line toward th right you will find A, under which you will ſee amon the figures for the days of the month, 24 for the fourt Sunday of December, conſequently the 25th of Dec happens on Monday.

2. Upon what day of the month does the ſecon Tueſday of November fall, in the year 1797 Anſ. the 14th.

I find the ſecond Sunday is the 12; then the ſecon Tueſday will be the 14th.

3. What day of the week is the 6th of Septembe 1798? Anſ. Thurſday.

Another way to find the day of the week.

RULE.

To the given year add its fourth part, its four hun dredth part, and the day of the year; from the ſum ſubtract the hundredth part of the year; then divid the remainder by 7. The remainder, when there i any, and 7 when there is no remainder, is the numbe required.

FOR THE OLD STYLE.

To the given year add its fourth part, the numbe 5, and the day of the year, divide the ſum by 7, a before.

he following Table ſhows, by help of the Dominical Letter, what day of the Week any Month begins on, for ever.

Mon.	Days	A	B	C	D	E	F	G
Jan.	31	Su.	Sa.	Fr.	Th.	We.	Tu.	Mo.
Feb.	28, 29	We.	Tu.	Mo.	Su.	Sa.	Fr.	Th.
Mar.	31	We.	Tu.	Mo.	Su.	Sa.	Fr.	Th.
Apr.	30	Sa.	Fr.	Th.	We.	Tu.	Mo.	Su.
May.	31	Mo.	Su.	Sa.	Fr.	Th.	We.	Tu.
June.	30	Th.	We.	Tu.	Mo.	Su.	Sa.	Fr.
July.	31	Sa.	Fr.	Th.	We.	Tu.	Mo.	Su.
Aug.	31	Tu.	Mo.	Su.	Sa.	Fr.	Th.	We.
Sep.	30	Fr.	Th.	We.	Tu.	Mo.	Su.	Sa.
Oct.	31	Su.	Sa.	Fr.	Th.	We.	Tu.	Mo.
Nov.	30	We.	Tu.	Mo.	Su.	Sa.	Fr.	Th.
Dec.	31	Fr.	Th.	We.	Tu.	Mo.	Su.	Sa.

On what day of the week does October begin, in e year 1797? Anſ. Sunday.

The dominical letter is A, which you will find at e head of he column; then direct your eye down.

wards, and at right angles with October is Sunda which begins the month.

A TABLE

Containing the number of plants required to plant Acre, both Engliſh and Scots, from 1 foot to 12 fe diſtances plant from plant.

Feet diſtance	Engliſh acre.	Scots acre.	Feet diſtance.	Engliſh acre.	Scots acre.
1	43560	54760	6½	1031	1296
1½	19360	24337	7	889	1117
2	10890	13690	7½	774	973
2½	6969	8761	8	680	855
3	4840	6084	8½	602	758
3½	3556	4470	9	537	676
4	2722	3422	9½	482	606
4½	2151	2704	10	435	547
5	1742	2190	11	360	452
5½	1440	1810	12	302	380
6	1210	1521			

How many plants may be planted, both on an En liſh, and on a Scots acre, at 3½ feet diſtance? A 3556 on an Engliſh acre; and 4470 on a Scots do. you will ſee in the above Table, oppoſite to 3½.

FORMS OF BILLS.

Peebles, January 23, 1797.

One month after date, Pay to me or order, in t Town Clerk's office here twenty pounds Sterling, v lue of

To Robert Andrew,
Merchant Innerleithing.

John Allan,
Robert Andre

A Receipt on the back thus:

Received payment of the within Bill, principal and intereſt,

John Allan.

Peebles, February 23, 1797.

Received of the within Bill fourteen pounds Sterling,

John Allan.

Where the drawer chuſes to convey a Bill to another perſon, it is done as follows: and is called indorſation.

Pay the contents to Titus Brown, or order,

John Allan.

A CONJUNCT BILL.

Peebles, 6th April 1797.

Conjunctly and ſeverally, ſix months after date, pay to me or order, at the Town Clerk's office here, for behoof of the Brotherly Love Society of Gardener's in the County of Tweeddale, the ſum of two hundred pounds Sterling money, value of

John Richard, Boxmaſter,

To Daniel Duff, Merchant Peebles; and Duncan White, Wright there.

Duncan White,
Daniel Duff.

FORMS OF PROMISSORY NOTES.

Edinburgh, Auguſt 5. 1797.

One day after date, I Thomas Gun, Writer in Edinburgh, promiſe to pay to John Williams, or order at John's Coffee houſe here, the ſum of forty pounds ten ſhillings Sterling, for value

Thomas Gun.

A JOINT NOTE FOR BORROWED MONEY.

Leith, May 2. 1797.

We, jointly and ſeparately, promiſe to pay to Samuel Gilbert, or order, on demand, the ſum of ten pounds Sterling, value reeeived

John Iron,
James Steel.

L. 300. *London, 6th September* 1797.

I promiſe to pay to Mr J. G. or order, on demand, three hundred pounds Sterling money, value received for ſelf and Co.

Gilbert Paywell.

A DRAUGHT.

L. 50, 10s. *Edinburgh, June* 1, 1797.

At eight days ſight, pay to George Rule, Merchant in Edinburgh, or order, fifty pounds ten ſhillings Sterling, value of

To Mr James Park, }
Merchant Leith. }

Joſeph Reid.

A TABLE

Showing how much yarn will work one yard of cloth, from a 4 hundred reed to a 25 do.

H	Cuts	Threads	H	Cuts	Threads
4	3	40	15	12	60
5	4	20	16	13	40
6	5		17	14	20
7	5	100	18	15	
8	6	80	19	15	100
9	7	60	20	16	80
10	8	40	21	17	60
11	9	20	22	18	40
12	10		23	19	20
13	10	100	24	20	
14	11	80	25	20	100

Note. Under H is the hundreds of the reed, and the other column contains the cuts and threads required to warp one yard of cloth from a 400 to a 2500.

Ex. 1. How many ſpindles of yarn will it require to warp 100 yards of cloth in a 5 hundred reed? Anſ. 26 ſpindles, 2 cuts.

To find the Spindles.

RULE.

As 1 yd : cuts and threads oppoſite to the hundreds of the reed required : : the yards : the ſpindles.

2. How many yards will 65 ſpindles, 3 ſlips, 10 cuts and 80 threads warp in a 19 hundred reed? Anſ. 200 yards.

To find the yards.

RULE.

As the cuts and threads oppoſite the hundred of th
reed required : 1 yard : : Spindles : yards.

A SMALL COLLECTION OF MISCELLANEOUS QUESTIONS.

Ex. 1. A Merchant, on balancing his books, find he has in caſh 412l. 10s. 6d. goods to the value of 650l 16s. 7d. in the ſtocks 1509l. 16s. $10\frac{1}{4}$d.

At the ſame time he owes A 47l. 15s. 8d. B 105l 18s. $9\frac{1}{2}$d C 14l. 15s. $2\frac{3}{4}$d. and D 304l. 10s. he foun his houſehold and perſonal expences amounted t 216l. 18s. 6d. what is his neat eſtate? Anſ. 1883l. 5s $9\frac{1}{2}$d.

2. A privateer takes a prize to the value of 285l 4s. of which the Captain gets $\frac{1}{16}$ each of ſix officers $\frac{1}{12}$ of the remainder and the private men being 45 in number get the reſt equally divided among them ; what i each man's ſhare ?

Anſ.	Captain's ſhare	178l.	4s.	
	Each Officer's ſhare	83.	10s.	$7\frac{1}{2}$
	Each Private man's ſhare	48l.	5s.	3.

3. There is a prize of 212l. 14s. 7d. to be divide among a Captain four men and a boy : the Captain i to have a ſhare and a half : the men each a ſhare : an the boy $\frac{1}{3}$ of a ſhare ; what ought each perſon to have? Anſ. The Captain 54l. 14s. $0\frac{2}{7}$d. each man 36l. 9s. $4\frac{2}{7}$d. and the boy 12l. 3s. $1\frac{3}{7}$d.

4. How many planks will floor a houſe $60\frac{1}{2}$ feet long, $3\frac{1}{2}$ feet wide, when the planks are 15 feet long and 5 inches wide? Anſ. $108\frac{7}{11}$

5. Queen Elizabeth came to the throne of England the 17th of November 1558, and died the 24th of March 1603, in the 70th year of her age; what year was ſhe born? And how many months, of 28 days each, did ſhe reign, reckoning 365 days, 6 hours to a year? Anſ. She was born in the year 1533, and reigned 578 months, 2 weeks, and 1 day.

6. A Stationer ſold quills at 11s. a thouſand, by which he cleared $\frac{3}{8}$ of the money: but growing ſcarce, he raiſed them to 13s. 6d. a thouſand: what did he clear per cent by the latter price? Anſ. 96l. 7s. $3\frac{3}{11}$d.

7. A grocer bought 2 cheſts of ſugar, the one weighed neat 17 cwt. 3 qrs. 14lb. at 2l. 6s. 8d. per cwt. the other weighed neat 18 cwt. 1 qr. 21 lb. at $4\frac{1}{2}$d. per lb. which he mingled together; I demand how much a hundred of this mixture is worth? Anſ. 2l. 4s. $3\frac{1}{2}$d. $\frac{1078}{4067}$.

8. Shipped for Jamaica 550 pair of ſtockings, at 11s. 6d. per pair, and 460 yards of ſtuff, at 14d. per yard, in return for which I had 45 cwt. 3 qrs of ſugar at 1l. 4s. 6d. per cwt. and 1570 lb. of indigo at 2s. 4d. per lb. what remains due to me of my adventures? Anſ. 02l. 12s. $11\frac{1}{2}$d.

9. My correſpondent writes me, that he has purchaſed goods on my account to the amount of 560l. 10s. what does his commiſſion come to, at $2\frac{1}{2}$ per cent? Anſ. 14l. 3d.

10. A manufacturer having an equal number of men, women, boys and girls employed, diſtributes 14l. among them per day; to each man he gave 1s. 2d. to each woman $7\frac{1}{2}$d. to each boy $3\frac{1}{2}$d. and to each girl 3d. how many had he of each? Anſ. 120.

11. If the expences of building a church that holds 2400 perſons amount to 1600l. and if $\frac{1}{4}$ of the ſeats be let at 3s. 6d. $\frac{1}{4}$ at 2s. 6d. $\frac{1}{4}$ at 1s. 6d. and the remaining fourth at one 1s. What per cent. do the heritors receive for their money, after paying their miniſter yearly 120l. of ſtipend? Anſ. 8. 4375l.

12. A labourer receives 14d. per day for every work day from 5th March (beginning on the 6th to 4th November incluſive, and $11\frac{1}{2}$d. per day during the reſt of the year. How much do his wages amount to in a year? Anſ. 17l. 4s. 8d.

13. A ſhip's company take a prize of 1000l. which they agree to divide among them according to their pay, and the time they have been on board: now the officers and midſhipmen have been on board 6 months, and the ſailors 3 months, the officers have 40s. a month, the midſhipmen 30s. and the ſailors 22s. a month; moreover there are four officers, 12 midſhipmen, and 110 ſailors; what will each man's ſhare be?

Anſ. each officer's ſhare 23l. 2s. $5\frac{0}{4}$d. $\frac{92}{173}$

midſhipmen 17 6 $9\frac{1}{4}$ $\frac{69}{173}$

ſailors 6 7 $2\frac{0}{4}$ $\frac{8}{173}$

14. The ſilk mill at Derby contains 26586 wheels, and 97746 movements, which wind off or throw 73726 yards of ſilk every time the great water wheel, which gives motion to all the reſt, goes about, which is three times in a minute. The queſtion is, how many yards of ſilk may be thrown by this machine in a day, reckoning 10 hours to a day's work? and how many in the compaſs of a year, deducting for Sundays and great Holydays 63 days; provided no part of it ſtands ſtill? Anſ. 40077453600 yards.

15. A merchant ſends to Spain 1300 pieces of broad cloth, each 47 yards, at 15s. 6d. per yard; to have returns from thence; the one half in wine, at 65l. per tun; and the other half in oranges, at 3l. 10s. per cheſt. What quantity of each will he have? Anſ. 364 tuns, 1 hhd. of wine. 6764 cheſts of oranges. $\frac{4}{5}$.

16. Three Farmers A, B, and C. hire a ſhepherd, for 12l. 10s. a year, they are to pay his wages in proportion to the number of ſheep each commits to his care; A has 608, B. 1200, and C 1500. What part of the wages muſt each farmer pay? Anſ. A 2l. 5s. 11¼d. 860. B 4l. 10s. 8¼d. 276. C 5l. 13s. 4¼d. 1172.

17. How much cloth at 5s. 6d. per yard, muſt be given in barter for 14 cwt. 3 qrs. of ſugar, at 3l. 10s. per cwt.? Anſ. 187 yds. 2 qrs. $3\frac{7}{11}$ nls.

18. If 1 lippy of lintſeed ſow 144 ſquare ells; how much will ſow an acre? and what will it coſt at 1s. 5½d.? Anſ. 10 pks. coſt 2l. 18s. 4d.

19. If a peck of potatoes plant 100 ſquare ells; how many will plant an acre? Anſ. 3 bolls, 2 fir. 1 pk. $2\frac{2}{5}$ lip.

20. If the half of a mark buy the fourth of a pound; how much cochineal can I have for a crown? Anſ. 3 ounces.

21. If a ſoldier be allowed 12 lb. of bread in 8 days; how much will ſerve a regiment conſiſting of 750 privates a year? Anſ. 183 tons, 6 cwt. 1 qr. 5 lb.

22. There is gained by trading with a ſhip 120l. 14s. now ſuppoſe that $\frac{1}{4}$ of her belongs to S, $\frac{3}{8}$ to T, $\frac{1}{8}$ to V, and the reſt to W, what muſt each have of the gain? Anſ. S, 30l. 3s. 6d. T, 45l. 5s. 3d. V, 15l. 1s. 9d. W, 30l. 3s. 6d.

23. An apothecary mixes 2℥5ʒ of ſyrup with 3℥4ʒ of rectified ſpirits of wine, and alſo 5℥ 2℈ 15 gr. of the bark with 4℥ 3ʒ 1℈ 8 gr. of mint water; how much do all theſe weigh? 11℥ 2ʒ 1℈ 3 qrs.

24. A gentleman has an eſtate conſiſting of 12000$\frac{1}{4}$ acres; what is his yearly and daily income, at 3$\frac{3}{4}$d. for every ſquare pole? Anſ. 30001l. 5s. yearly. 82l. 3s. 10$\frac{3}{4}$d. $\frac{29}{73}$. daily income.

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